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ENERGY FUELS AND RELATED EQUIPMENT

MORE ATOMIC POWER EQUIPMENT OUTPUT NEEDED

Leningrad LENINGRADSKAYA PRAVDA in Russian 8 Dec 77 p 2

[Article by Doctor of Technical Sciences V. Glukhikh, director of the Scientific Research Institute of Electrophysical Apparatus imeni D.V. Yefremov: "Equipment of High Capacities"]

[Text] A leading role in development and creation of equipment of atomic electric power plants is set aside, as is known, for Leningrad. Right after the manufacture of the pilot model of an atomic power engineering installation with a reactor with a capacity of 1 million kilowatts in the Izhorskiy Zavod Association, production of this equipment is beginning. In order to cope with such a serious task, it is necessary for the association to carry out a broad program of technical retooling, including outfitting the production facility with the latest control and testing equipment for insuring high quality and reliability of the products.

When over two years ago 40 Leningrad enterprises and organizations concluded an agreement about joint cooperation and made socialist pledges directed at timely output of equipment of atomic power engineering, created in the coordination council was a special section for control of the quality and reliability of the products. The section was made up of Lengiprottyazhmash [Leningrad State Planning Institute for Heavy Machine Building], the NIIIEFA [Scientific Research Institute of Electrophysical Apparatus] imeni Yefremov, the special design bureau (OKB) of technical cybernetics under the Leningrad Polytechnical Institute imeni Kalinin, and the Izhorsk Plant and the Plant for Hoisting and Transport Equipment imeni Kirov.

The essence of the problem which had to be solved by the joint efforts of science and production was reduced to the following.

The most crucial units of atomic electric power plants are the vessels of the reactors, the steam generators, and the steam separators operating in the radioactive medium under high pressure. In addition, any leakage of water or steam is impermissible. The vessels, especially their welded seams, should not have blisters, cracks or impurities which in the process of operation may lead to destruction of the items and to breakdown of the equipment of the atomic electric power plant.

Raised with all acuteness was the question of development of such apparatus and those methods of control which would make it possible with great accuracy to "examine" the item through its whole thickness and determine a defect or absence of a defect. For instance, in vessels of reactors with the thickness of the walls up to 30 centimeters it is necessary to determine a defect less than 3 millimeters in size.

Solution of the problem was taken up by the collective of the Scientific Research Institute of Electrophysical Apparatus imeni D.V. Yefremov. For quality control, particularly of the vessels of atomic reactors, it was proposed to use linear electron accelerators.

A large collective of scientists and engineers from the institute took part in developing such accelerator-defectosopes. Among them were: senior scientific associate of the division of linear accelerators, candidate of technical sciences V.M. Nikolayev; chief of the laboratory of complex adjustment and studies of linear accelerators, candidate of technical sciences I.A. Prudnikov; candidate of technical sciences V.L. Smirnov (being developed in his laboratory is the very heart of the installation--the accelerating system); and the present secretary of the institute's party committee V.Ya. Shikhov.

It must be said that the times which were set aside for our institute for this work required not only clear coordination with other enterprises and organizations, but also filling out the schedule of research in in-house laboratories and divisions. At the head of the combined brigade, which included not only designers and planners, but also workers in our pilot production facility, was an outstanding specialist in his field, a good organizer, the chief of the department of linear accelerators, doctor of technical sciences, State Prize winner, communist Yu.P. Vakhrushin.

Now, when two accelerator-defectosopes have already been manufactured, and two others should be completed before the end of this year, it is necessary especially to stress the high professionalism of the workers in the combined brigade. Particularly of the brigade leaders of the assemblers, holders of the Order of Labor Red Banner, communists A.I. Pogunov and S.N. Nuzhnyy, and also lathe-hand V.P. Il'in.

What are the accelerators to which such a crucial role is given during production of equipment of atomic electric power plants? What technical or, more correctly, physical principle is at the basis of their operation?

In the installation electrons are accelerated to a voltage on the order of 10 million volts. Having attained this state, they are struck against a target made of heavy metal, for instance gold or tungsten. Then generated here also is a controlled flux of braking radiation, which illuminates, let us say, the welded seam of the vessel of the atomic reactor and, creating an image on a sensitive film, establishes the diagnosis.

It is not enough, however, to say that linear accelerators of electrons make it possible to look through thick-walled parts, they also insure, (and this is an extremely important circumstance) high productivity of control. Thus, control of an annular seam of a reactor vessel 20 centimeters in thickness is accomplished almost 6-fold faster than with the old method.

In this way, accelerators of charged particles, created initially as tools of science, have firmly gained a place in production. In the given case they have received a new occupation--as quality controllers.

However, as was justly noted at the 25th party congress, modern production is making new demands not only on the machines, but on the workers themselves, on those who create these machines and control them.

In fact, the presence at a plant of precision tools for control--the charged-particle accelerators--increases the responsibility of the workers during manufacture of the products, it indirectly affects advancement of their skills and improvement of the manufacturing technology. Everyone knows that the all-seeing "eye" of the accelerator will find even an insignificant flaw, which it is necessary to eliminate, which is not always easy to do.

Since the accelerator by itself is a complex device, in which are concentrated the latest advances of radio- and electrical engineering, electronics, vacuum technology, the control of it requires a high level of production, a high professional level for the workers. It is no accident that a new specialist, the physicist-engineer, has appeared in the shops of Izhorskiy Zavod.

Speaking to the point, the collective of our institute is working not only on this type of accelerator-defectoscope for the Izhorskiy Zavod Association. Such units are intended and will operate in the shops of the giant of Soviet industry--Atomash [Atomic Machine Building Plant]. Two of them are already in production.

In telling about how in the framework of cooperation of 40 enterprises and organizations working on one of the main paths of Soviet power engineering we were able to manage the concrete task given to us, I do not at all want to say that we resolved all problems without exception. Absolutely not.

Today, like yesterday, the weak spot in production of products for atomic machine building remains automation of the control process. Up to now a series of operations, for instance marking of welded seams, placement of cassettes with X-ray film, development of the film, and so on, is done manually and takes considerably more time than the very process of X-ray inspection. The problem has turned out to be somewhat more complex than could be shown at first glance. This is why we are working on it

jointly with specialists of the Leningrad State Planning Institute for Power Machine Building, the special design bureau of technical cybernetics of the Leningrad Polytechnical Institute, with designers of the PTO [possibly, production and technical department] imeni S.M. Kirov and, finally, Izhorskiy Zavod Association. It occupies an important place also in the work of the section for quality control in the coordination council.

The joint efforts are bearing their fruit. Designed and in the stage of manufacture is the first model of a robot to which we are preparing to entrust the marking of welded seams, the installation and replacement of film cassettes. The researchers, meanwhile, are working out a remote method of detecting defects with subsequent transmission of their images on a television screen. The planners have also been given an important task. They are working on a plan for a unitized X-raying chamber, striving for not only its absolute reliability during operation, but also maximum outfitting of it with automatic means of control.

Great and difficult work is ahead. The difficulty is in that much is being done by us for the first time in domestic practice. But, having made such a crucial step--having put the charged particle accelerators in the service of atomic machine building, we intend with greater urgency to follow the road chosen. An atomic power installation with a capacity of a million kilowatts is the base reactor during construction of atomic electric power plants in our country for the next 10-15 years. This important national economic mission can be resolved only with the unified forces of science and production.

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CSO: 1822

HISTORY, PRESENT DEVELOPMENT OF UZBEK POWER SYSTEM

Tashkent STROITEL'STVO I ARKHITEKTURA UZBEKISTANA in Russian Nos 11/12,
Nov-Dec 77 pp 8-11

[Article by F. G. Poturemskiy, first deputy minister of power and electrification Uzbek SSR: "The Republic's Man-Made Sun"]

[Text] People of the older generation can remember a time when a kerosene lamp was a rarity in the home. It was replaced by a home-made oil-soaked wick and a tallow candle. In small cottage and semi-cottage cotton gins, oil mills, tanneries, and mills, also to meet the needs of irrigation, the motive power used was horses and camels, primitive water wheels, and, less frequently, steam and kerosene engines.

In 1923, in accordance with GOESLRO [State Plan for the Electrification of Russia], on the outskirts of Tashkent, on the Bozsu Canal, construction began on the first born of Uzbekistan's power engineering--the Bozsu GES with a capacity of 4,000 kilowatts, the first phase of which went into operation on 1 May 1926 with two units of 1,000 kilowatts each.

The intensive development of the republic's industry required the construction of new, more powerful power plants. In 1933 the Kadyr'ya GES went into operation with 13,000 kilowatts capacity, and work began on the development of the Chirchik-Bozsu water tract, where in 1936 construction was completed on the Burdzhaz GES with a capacity of 6,000 kilowatts, and in 1940-1941 construction got underway on the Komsomol'sk and Tavak GES's totaling 160,000 kilowatts capacity.

The development of power engineering in the Fergana Valley, thanks to the availability of local coal, took place on the basis of the construction of thermal power plants. To supply electricity and heat to the Fergana textile mill and oil plant, in 1930 Central Asia's first TETs was built--Zarya Vostoka--with a capacity of about 10,000 kilowatts.

To supply Bukhara with electricity, a diesel power plant was built in 1936; to supply heating to the oil plant in Kattakurgan, a TETs of more than 10,000 kilowatts capacity was built. On the basis of coal from the Kirgiz and Tadzhik fields, in 1939 construction was completed on the Tashkent TETs

with two turbo generators of 6,000 kilowatts each, and the Kuvasay GRES with a turbo generator of 12,000 kilowatts.

During the Great Patriotic War, large numbers of industrial enterprises were transferred to Uzbekistan; this required substantial expansion of the republic's energy base. For the purpose, the people's construction projects method was used to build the Aktepinskaya, Akkavak, Kibray, Salar, and Nizhne-Bozsu single-unit GES's on the Bozsu canal, installing evacuated equipment in them. During the difficult war years, the Uzbek people began the construction of the Farkhad GES on the Syrdar'ya with a capacity of 126,000 kilowatts. This plant opened up the possibility for further development of the chemical and coal industry, ferrous metallurgy, and also other sectors of the national economy, and at the same time resolved the very urgent problem of gravity-flow irrigation of 600,000 hectares of fertile land on the Dal'vezinskaya and Golodnaya steppes. In recent years, six GES's have been built on the Bozsu Canal, two on the Shaarikhan Canal, and three on the Dargom Canal.

In the years since the war, brown coal from the Angren field and Kirgiz hard coal have served as the basis for the construction of highly-economical large-scale thermal power plants with high steam parameters: the Angren GRES of 600,000 kilowatts and the Fergana TETs imeni V. I. Lenin of 230,000 kilowatts.

The discovery of reserves of natural gas in Bukharskaya Oblast in the 1950's made it possible to further develop the republic's power engineering through the construction of new powerful thermal power plants. Between 1963 and 1971 the main thermal power plants of the Uzbek power system were built and went into operation--the Tashkent GRES (almost two million kilowatts), the Navoi GRES (830,000 kilowatts), and the Takhiatash GRES (350,000 kilowatts). The development of Uzbekistan's power engineering during the Ninth Five-Year Plan was characterized not only by quantitative but also qualitative changes. Thermal power plants were built to run on super critical steam parameters with the installation of highly-economical equipment matching the best world models. By the end of the Ninth Five-Year Plan, four high-pressure hydro-units of 150,000 kilowatts each went into operation at the Charvak GES; the Navoi and Takhiatash GRES's were enlarged. Also put into industrial operation was the Tashkent GRES--the largest power plant in the Soviet Union with open equipment components. Thanks to the low cost of construction and the high operational economy of the equipment, outlays on its construction were recovered in record time. Construction was completed on the first phase of the Syrdar'ya GRES of 1.2 million kilowatts capacity, and two of its power blocks over and above the five-year plan, of 300,000 kilowatts each, were put into operation.

The construction of electrical networks went on simultaneously with that of power plants on a large scale. In 1926, when the first Bazsu GES went into operation, the highest voltage in the electricity networks was six kilovolts, and they were built only in the central portion of Tashkent. In 1931, the first power line of 35 kilovolts was built, stretching about

20 km from the Fergana Zarya Vostoka TETs to the Kuvasay cement plant. The year 1939 saw the completion of the first power line of 110 kilovolts from the Kuvasay GRES to Andizhan and the republic's first 110-kilovolt substation in Andizhan. During the Great Patriotic War, the Farkhad GES was linked to Tashkent and Chirchik by Central Asia's first 110-kilovolt double-circuit line. The completion in 1957 of the republic's first 220-kilovolt power line between the Kayrakkum GES and Tashkent launched the consolidation of individual, isolated power units into a single power system.

By 1970, 2,340 km of 220-kilovolt power lines had been built, including a power ring around Tashkent. Two-hundred-twenty-kilovolt lines were built from the Angren GRES to Almalyk, Tashkent, and the Fergana Valley; from the Kayrakkum GES to Samarkand, Navoi, and Bukhara; from the Navoi GRES via Zarafshan, Urgench to the Takhiatash GRES; from the Tashkent GRES to the Chardar'ya GES and Chimkent--this made it possible to consolidate formerly isolated centers of the Uzbek power system into a single whole, also to lay the foundations for a consolidated power system of the republics of Central Asia and the southern oblasts of Kazakhstan.

The Ninth Five-Year Plan saw the construction of the first 500-kilovolt power line: Tashkent GRES--Syrdar'ya GRES--Andizhan--Toktogul' GES; this made it possible to transmit electrical power of up to one million kilowatts over great distances with minimum losses. With the development of the power system, and consequently the increasingly greater coverage of the republic's territory, and the elaborated network of long distance and distribution power lines, starting with the mid-1950's it became possible to convert agriculture to centralized electricity supply.

Especially rapid rates of electrification of agriculture have been ongoing since 1963, when the union-republic Ministry of Power Engineering and Electrification was organized; it concentrated the generation and distribution of electricity, also the construction of distribution networks. By 1977, the length of the electricity networks of all voltages totaled 142,000 km, while power plant capacity stood at 15.5 million kilowatt-amperes; as a result, almost all kolkhozes and sovkhoses are supplied with electricity from the Uzbek power system, and the degree of electricity centralization stands at almost 100 percent.

Blanket electrification of the republic has substantially eased the labor and enhanced the cultural level of the rural inhabitants: radios, television sets, and household appliances are now an established part of every farm worker's home. Blanket electrification has also made it possible for many farms to undertake the development of highly mechanized livestock complexes on an industrial basis, also modern, well-equipped enterprises to process farm products.

Extensive use is made of electricity to supply power to large and small scale pumping stations of machine irrigation, including the world's largest cascade of pumping stations on the Karshinskiy long distance canal, four pumping stations of the first and second phases of the Amubukhara Canal,

and a large number of irrigation and drainage wells with a total installed capacity of about 1.5 million kilowatt-amperes with an annual electricity consumption of about three billion kilowatt hours.

1913	22,000 hp
GOELRO	40,000 kw
Today	7.2 million kw

The total capacity of all power operations in Turkestanskiy Kray in 1913 stood at 22,000 hp.

The GOELRO on the territory of Turkestan called for the construction of power plants of 40,000 kw capacity.

The capacity of Uzbekistan's power plants at present stands at 7.2 million kilowatts.

The amount of electricity generated per capita in Uzbekistan stands at 2,100 kw-hours; this exceeds the pre-revolutionary level by more than 3,000 times.

This pace of sector development is unprecedented on our planet; it became possible thanks to the Great October Socialist Revolution.

Uzbek power engineers have made a major contribution toward perfecting the operation of power facilities and the adoption of the latest methods of power system management. Uzbekistan was the first in the country to adopt the new form of GES administration--cascading. It calls for consolidating GES's located on one water flow into a single power enterprise--the cascade. To administer it, a unified directorate is set up to exercise administrative and technical supervision over all GES's making up the cascade. Cascading has made it possible to sharply reduce the size of the administrative-management apparatus, to reduce the number of operations personnel, to centralize repair operations, to reduce normatives of standby equipment, materials, and instruments, to reduce the volume of capital investments in the construction of administrative buildings, warehouses, and other structures, and to sharply reduce the prime cost of generated energy. Following the example and experience of Uzbekistan's power engineering workers, the cascading of GES's has been adopted in all of the Soviet Union's power systems.

During the post-war years, efforts were concentrated on resolving completely new tasks involving automation of technological processes in GES's, with subsequent installation of remote control. As a result, 11 power plants were completely converted to automatic control; this made it possible to release 250 operations personnel workers. At the same time, efforts were focused on installing remote control for the centralized running of the

power system. For this complex of projects, a group of Uzbek power engineering workers was awarded the USSR State Prize.

The second stage of automation of technological processes was the implementation starting with the late 1950's, of integrated automation of thermal power plants, using electronic equipment. This work made it possible for boiler engineers and their assistants to expand their job assignment zones and to eliminate the posts of water inspectors, ash-pit workers, and blast workers with their extremely difficult and unhealthy working conditions. In addition, a new profession came into being--the power block engineer, whose work is based on supervising the operation of a number of automatic systems in the boiler--turbine--generator block from central and consolidated control panels provided with comfortable working conditions and conditioned air.

Since its organization in 1963, the Uzbek SSR Ministry of Power and Electrification has been operating on the very efficient double-link structure of administration: ministry--enterprise (power plant, network enterprise, construction-installation organization). All other union-republic ministries and large main administrations of power and electrification in the country operate on the three-link structure: ministry or main administration affiliated with the republic council of ministers--regional power administration--enterprise.

The Uzbek power system was one of the first in the USSR to adopt mathematical methods and computer technology to handle operational tasks; for the purpose, a computer center was set up in 1964 using Ural-2 computers, along with a special computer technology service. The administration and control of technological processes in four 300,000-kw blocks at the Syrdar'ya GRES is handled by means of IV-500 UM information-computer machines which handle the collection and primary processing of essential information concerning technological parameters and also record and calculate them. In 1974, on the basis of the newly-completed computer center using second-generation M-222 and third-generation--M-600 and YeS--1030 computers, for the first time among the Soviet Union's power systems, the first phase of the Uzbek power system's ASU [automatic control system] went into production ahead of schedule; it handles about 100 tasks involved in the operations-dispatcher and organizational-economic administration of the republic's power engineering.

Uzbekistan's power engineering has made giant strides in the time since the Great October Socialist Revolution. The tasks assigned to power engineering workers by the 25th CPSU Congress and the 19th CP Uzbekistan Congress are even more complex technically and vast in volume. By 1980 electricity consumption should rise by almost 1.5 times compared with 1975, reaching 42 billion kilowatt-hours, and the growth of electricity consumption in agriculture will rise by two times, reaching 10 billion kilowatt-hours.

In order to meet the electricity requirements of the republic's national economy, the Tenth Five-Year Plan calls for introducing power capacities of about three million kilowatts, including six power blocks of 300,000 kilowatts each at the Syrdar'ya GRES (the plant's capacity will be raised to three million kilowatts); two central heating turbo generator units of 100,000 kilowatts each at the Fergana TETs; two power block of 210,000 kilowatts each at the Navoi GRES; on the basis of increased coal production at the Angren coal field, the first power block of 300,000 kilowatts at the Novo-Angrenskaya GRES with a projected capacity of 2.4 million kilowatts; the Khodzhikent and Gazalkent GES's of 285,000 kilowatts, thus completing the construction of the Middle Chirchik cascade of GES's, and the cascade's capacity will reach almost 900,000 kilowatts; and two GES's of 100,000 kilowatts each to be built on the Andezhan and Tuyamuyu irrigation reservoirs. Construction will begin on the Talimardzhan GRES, with four power blocks of 800,000 kilowatts each.

Simultaneously with the construction of power facilities, plans call for the integrated construction of housing, schools, kindergartens and nurseries, dispensaries, boarding houses, hospitals, clubs, vocational-technical schools, tekhnikums, and a number of cultural-service facilities for the power engineering cadres.

Today, the cities and population centers of Uzbekistan are bathed in a sea of electric lights. Lenin's dream--that of electrifying all of Russia, industry, and agriculture--has been realized. The manmade electrical sun has transformed the life and labor of Uzbekistan's workers. It has become a firm part of every home, filling it with light and happiness, giving wings to socialist industry and agriculture, expanding the horizons of scientific discoveries and labor accomplishments. The rise and development of Uzbekistan's power engineering to the present level has been possible thanks to the paternal, day-to-day concern and attention and help on the part of the Leninist CC CPSU and the Soviet government, the CC CP Uzbekistan, and the Uzbek SSR Council of Ministers, the vanguard role played by party members in efforts to build up the national economy's energy potential.

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COMMENTS ON USSR ENERGY WORKERS DAY

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 22 Dec 77 p 1

[Article by P. Yusim, N. Remezov, V. Saakyan, and Ye. Borisov: "With a Giant Step"]

[Text] Power engineers and energy industry construction workers are greeting their profession's holiday with considerable success. They have accomplished much in this jubilee year to make work even easier and life even warmer and brighter for Soviet citizens. But new tasks lie ahead. They were specified at the December (1977) CPSU Central Committee Plenum and the Eighth Session of the USSR Supreme Soviet, which ratified the country's state economic and social development plan for the third year of the five-year plan. The session documents state: "Production of electric power will be boosted to 1,207 billion kilowatt-hours, an increase of 4.8% over 1977."

Power industry specialists share their doings and plans in this article.

With High Reliability -- P. Yusim, director, Ust'-Ilimsk GES

Our work force celebrated an important event during the days of the October jubilee: the 15th and final unit went into operation ahead of schedule. Reaching designed generating capacity by our hydroelectric power station constitutes a great labor victory for power engineers and construction workers, a feat which received high praise in a message of greeting sent by Comrade L. I. Brezhnev. Today all 15 generating units at the Ust'-Ilimsk station are operating with a high degree of reliability.

Only a few days remain until the end of the jubilee year. The work force resolved to generate above-target at least 1 billion kilowatt hours of electricity on the four generating units put into operation ahead of schedule; this will save the nation's economy 400,000 tons of standard fuel.

At the finish of the jubilee year a labor example is being displayed by shift foreman Aleksey Ivanovich Karnaukhov, generating unit attendant Yakov

Sviridovich Maslennikov, senior foremen Oleg Ivanovich Pankratov and Yuriy Vasil'yevich Sedykh, and mechanics Nikolay Viktorovich Zaytsev and Vladimir Yakovlevich Malyshev.

Construction workers are working side by side with operating personnel -- performing final adjustment on new equipment and various assemblies. All have a single goal -- to build a firm foundation for successful performance in the third year of the five-year plan.

From Grams, Thousands of Tons -- N. Remezov, Director, Kostroma GRES

Based on the results of the first 11 months of the year, our work force has achieved the best figures in the branch on specific fuel consumption per kilowatt hour of generated electricity -- 321.4 grams. This resulted in savings of 22,000 tons of standard fuel. This was achieved through extensive employment of advanced methods of power generating equipment operation and optimization of equipment operating conditions.

Our station's power engineers are doing everything possible to complete the year's target by 29 December and to generate 30 billion kilowatt hours of electricity. Our work force contains many leaders in competition for a worthy completion of the jubilee year. A particularly successful performance has been produced by senior generating unit attendant Vitaliy Yakovlevich Vikhorev, who was the first to meet the target of the first two years of the five-year plan.

Right now things are being readied at the station to install a custom generating unit of 1,200,000 kilowatts. The workers at the Leningrad Metals Plant have already fabricated the turbine, which will be a unique standard in Soviet power machinery engineering.

Atom at Work -- V. Saakyan, construction superintendent, Kursk Nuclear Power Station

In October the power engineers at the Kursk Nuclear Power Station reached designed generating capacity on the first generating unit. Now construction and installation work on the second unit is in full swing: installation and bracing of the second nuclear reactor began a few days ago.

The Spetsatomenergomontazh brigades of Vladimir Paklin, Nikolay Voronin and Aleksandr Ponomarev are doing an outstanding job on construction of the second generating unit. A good job is also being done on the third, reserve generating unit, the performance leaders being the Promstroy Administration Komsomol-youth brigades of Nikolay Toder and Viktor Lagvilava.

During these busy days construction workers are working with redoubled energy and responsibility, striving for successful completion of the target.

Ye. Borisov, First Deputy Minister of Power and Electrification USSR,
Comments

The 10th Five-Year Plan specifies the principal directions and areas of growth in power generating capacity, taking into account improvement of the fuel-energy complex. In order to supply electricity to the European part of the country, for example, which is heavily populated and contains large numbers of industrial plants, priority to growth of nuclear power is a more reasonable solution. In the eastern part of the country, containing great fuel and hydropower resources, preference is given to comprehensive utilization of the large rivers, as well as construction of big power complexes burning cheap coal from the Ekibastuz and Kansk-Achinsk fields.

Implementing the resolutions of the 25th CPSU Congress with shock-work labor, many construction work forces in the jubilee year are completing new units considerably ahead of schedule. The Zaporozh'ye and Uglegorsk GRES have become Europe's largest. Today each has a generating capacity of 3.6 million kilowatts. The Ust'-Ilimsk GES reached designed output 2 months ahead of schedule. Power industry construction workers will pour a million cubic meters of concrete into the dam at the Sayan-Shushenskaya GES. A million-kilowatt generating unit is successfully reaching designed output at the Kursk Nuclear Power Plant. A second reactor of equal generating capacity is now under construction there. Million-watt units have been put into operation or are currently under construction at other nuclear generating plants as well.

Fuel consumption to produce 1 kilowatt hour serves as a most important indicator of the efficiency of our work. In this past year specific fuel consumption at thermal electric power stations has declined on the average to 334,4 grams nationwide. Heat and electric power plants are operating even more economically. They consume 173.3 kilograms of fuel to produce each gigacalory of heat -- 0.1 kilogram less than last year. This would seem to be not very much, but for the nation as a whole it has resulted in annual savings of approximately 2 million tons of standard fuel.

The people at the Kostroma, Karmanovskaya, Irikhinskaya, and Central Urals natural gas and fuel oil GRES have achieved considerable success in reducing fuel consumption. The Yermakovskaya and Reftinskaya stations have become the best among the coal-fired plants. Unfortunately some work forces still consume more fuel than the specified standards.

Socialist competition among the power engineering people in the jubilee year helped the work forces at TETs-23 of Mosenergo, the Zaporozh'ye and Syrdar'ya GRES put new generating capacity on-line ahead of schedule.

Adoption of a comprehensive quality control system is helping improve technical-economic indices. This is persuasively indicated by the experience of the Lukoml'skaya GRES and Minsk TETs-3.

Making preparations for the most critical period in their operations -- the fall-winter maximum consumption season -- our power engineers have repaired more than one fourth of generating plant equipment in a timely manner. An excellent job in the repair and maintenance campaign, for example, has been done by the work force at the Krasnoyarsk GES. Reducing repair time on hydroelectric generating units by mobilizing internal reserves, they produced savings of 71,000 rubles.

Increasing volume of production and consumption of electric power and thermal energy as well as the need to increase the reliability and economy of energy supply have demanded creation of the world's largest power grid -- the USSR Unified Power System.

The tasks assigned this branch by the December (1977) CPSU Central Committee Plenum and by the state economic and social development plan for the third year of the five-year plan are not easy. They will require of each of us the ability to work efficiently and with precision.

New, modern equipment will come on-stream in 1978. It must be put into operation in such a manner as maximally to utilize the capabilities engineered into this equipment. Output of electricity and heat must be increased, while reducing specific fuel consumption. This will demand of our power engineering workers a good deal of creative initiative and effective competition for achieving high production results.

3024

CSO: 1822

SEVERE WEATHER CONDITIONS COMPLICATE POWER ENGINEERING WORK

Minsk SOVETSKAYA BELORUSSIYA in Russian 17 Feb 78 p 1

[Article: "Power Transmission Lines in Tyan'-Shan'"]

[Text] The first section of the 500-kilovolt power transmission line connecting the Toktogul'skaya GES with Frunze has been installed in the Botolu Pass in Tyan'-Shan'. Special reinforced poles, which can withstand snow-storms, hurricane winds, ice and "direct hits" by avalanches have been mounted on the rocky slopes.

"This power main, constructed at altitudes reaching 3.5 kilometers above sea level," said M. Azrilyan, head of the Kirgiz SSR Main Administration for Power Engineering and Electrification, "will connect the power systems of Kirgiziya's south and north."

The builders of the 500-kilovolt power line are storming the mountains from both sides. Their work is not easy; after all, at this time of year, hurricane winds carrying snow sometimes do not die down for days at a time in Tyan'-Shan'. But the builders are skillfully using each weather "gap" to install another pole and hang the next "string" of wires. All brigades are working 2 to 3 months ahead of schedule. The use of helicopters has reduced the amount of time required to install metal structures by 50 percent. The new 500-kilovolt line is to begin transmitting power during the fourth quarter.

8588

CSO: 1822

ELECTRICITY CONSUMPTION IN OFF-PEAK HOURS URGED

Moscow IZVESTIYA in Russian 11 Feb 78 p 2

[Article by V. Mikhaylov, chairman of the Committee on Industrial Power Engineering, All-Union Council of Scientific and Technical Societies: "The Price of a Nighttime Kilowatt"]

[Text] It is well known that charts of the load on the energy system show two pronounced peaks, in the evening and the morning. Between them is a zone or relatively lower load, while there is a greater drop in the nighttime hours. The faster-than-expected growth of energy consumption for municipal and domestic needs and in agriculture is leading to increased imbalances in the daily and weekly charts. The difference between the peak load and the nighttime trough in the European sector of the Integrated Power System in winter already amounts to about 40 million kilowatts.

Hydroelectric stations are being used to meet energy demands during peak hours, but their capacity is already insufficient, and it has become necessary to press into service units in thermal power stations. This means that large power blocks have to be started up for short periods and then stopped. Each such operation entails large losses of fuel. This is why one of the greatest power engineering problems is that of evening out the load charts.

The basis of these charts is the enterprises in 24-hour operation. It is they, and particularly plants with energy-intensive production, which must play the main role in evening out the loads over the course of the day. This will be achieved, in particular, by lowering the operating intensity of energy-intensive units during the hours of maximum load and stepping it up during the rest of the day. Data from Gosenergonadzor [State Inspection for Industrial Power Engineering and for Power Engineering Supervision] indicate that in 1976 the implementation of such measures made it possible to reduce the peak load on the entire Unified Power System by 3 million kilowatts. Thus, for example, switching the mills in cement plants to a regulated energy consumption regime made it possible not only to "unload" the peak hours, but also to save these plants 2 million rubles formerly spent on electric power. When the Ministry of the Coal Industry adopted larger-volume water collectors in its mines, the load from water pumps during peak hours decreased by more than half a million kilowatts.

Nonetheless, the main potential for more even distribution of the load on the energy system resides in optimal selection of capacities of industrial installations which are still in the planning stage. This potential can be realized by specifying in advance, for enterprises that operate around the clock, equipment capabilities that will allow fulfillment of the output plan while lowering energy consumption during the hours of most intense loading of the energy system and increasing the load as much as possible during the night.

This alternative is extremely favorable economically, since the cost of a kilowatt of industrial capacity is significantly lower than the cost of a kilowatt of power in the energy system. If producing 50,000 tons of calcium carbide a year requires an installation with a capacity of, say, 20 megawatts, and a cost of a million rubles, then the total expenditure in the national economy under the usual regime of round-the-clock operation will come to 6.5 million rubles. But it is possible to produce the same quantity of carbide by using a furnace of double the capacity operating at full capacity only at night and decreasing its energy consumption to perhaps a quarter during the rest of the time. Although such a furnace will cost twice as much, total expenditure will be decreased by 1,750,000 rubles.

This can be explained simply: since the total capacity of the installation is needed only during the hours when the energy system is not loaded, the demand for employment of additional power capabilities will be cut in half.

In short, the superiority of such an alternative is clear. Nonetheless it has virtually never been adopted in practice. The reason is the bureaucratic interests of the ministries, which find it more advantageous to take into account only their "own" capital investment expenditures and to be guided by the arithmetical rule that two is always more than one. This means that, if we come back to the carbide example, the second alternative is at present out of the question. It is immaterial to the leaders of the ministries that their advantage entails the loss of almost 2 million rubles in the national economy.

More than that, even if the enterprises had a reserve of industrial capacity, it would immediately be put into service, since there would only arise a necessity for increasing output--for, to be sure, production up to capacity improves utilization of operating capital.

In the standard method of determining the economic efficiency of capital expenditures that was approved back in 1969 and is compulsory for all departments, it is clearly stated that: "expenditures in associated industries must be taken into account in determining the economic feasibility of the various alternatives, so as to increase the efficiency of the entire national economy. In practice, however, everyone sees it differently: the reserves of industrial capacity in industrial enterprises and individual types of production, which were built at different times with an eye to various regimes of operation during the 24 hours, have been used to the limit by order of the ministries.

Now, when powerful electrothermic, electrolytic and plasma installations and large-scale pumping stations for irrigation and land reclamation are being planned and constructed in this country, the importance of the nighttime kilowatt is growing even faster. In our view, Gosstroy USSR, Gosplan USSR, the Ministry of Electrification and Power Engineering and the industrial ministries must determine for each enterprise the optimum level of regulation of the energy consumption regime.

Optimum regulation of energy consumption regimes is real conservation of capital expenditures and of millions of tons of fuel in the national economy. Here "one's own" bureaucratic interests are inadmissible. This is quite clearly stated in the Summary Report of the Central Committee of the CPSU to the 25th Party Congress: "Management and especially planning activities must be directed toward the ultimate result for the national economy. Such an approach will become especially critical as the economy grows and becomes more complex, when these ultimate results will depend even more on a multitude of intermediate links and on a complex system of intrasectorial and intersectorial connections."

8480

CSO: 1822

SAMOTLOR, TURKMENGAZPROM DISCUSSED

Moscow IZVESTIYA in Russian 18 Jan 78 p 2

[Article by V. Kozlov and V. Letov: "More Fuel for the Nation"]

[Text] Rhythm of Samotlor

Since the beginning of the war the work force of Glavtyumenneftegaz has drilled 142,500 meters, has completed drilling 68 wells, and has produced 10.5 million tons of crude oil. Above-target crude oil production already totals 93,000 tons.

Comrade L. I. Brezhnev called establishment of the Western Siberian fuel and energy complex a genuinely great project of our time. Intensive labor by the tens of thousands of persons involved in developing sources of "black gold" will finally be given the crowning touches by the oilmen. These are the people who go out into the taiga and the swamps to raise oil derricks skyward and who drill deep down toward the productive formations. It is those who bring oil to the surface with the aid of the latest equipment, who initial-process purify it and transport it through buried steel pipelines to the refineries. From the very first days of development of the Siberian petroleum virgin lands, the derrick erectors, drillers and production people have been displaying examples of selfless labor and an innovative approach to the job. In only two five-year plans Western Siberia has been transformed into the country's principal oil and gas production base. The complexity and unusual character of the natural conditions as well as the rapid pace of development of mineral resources have led to the necessity of finding totally new technical solutions in all production components. More than 50 scientific research institutes and planning-design organizations are working on problems of development of the petroleum industry of the Tyumen' North. The productive alliance between production people and scientists has made it possible not only to shorten development time but also to secure considerable economic effect.

A powerful industrial base has been established at Samotlor, where the large structural components of drilling rigs are born. This has shortened erection time and has eased the labor of the derrick erectors, has improved the quality and operational reliability of the drilling rigs. The cluster method

of drilling, where 20 directional wells are drilled from one site, has reduced by tens of times the cost of preparation, construction of roads and utility lines. The combined team system of organization of labor, a high degree of skill and mastery of adjacent job skills have enabled the derrick erection brigades of Heroes of Socialist Labor Ya. Vagapov and A. Timchenko to hold firmly to the lead in competition. Working under difficult conditions, these work forces are building a hundred rigs and more per year.

Many bold technical solutions have been adopted in drilling wells, and a Tyumen' drilling school has formed. The names of foremen G. Levin, A. Shakshin, G. Petrov, and M. Sergeyev are today known all over the country. The brigade of foreman V. Gromov became last year's drilling champion. With four shifts it drilled 78,288 meters of production wells. Today automation and remote-control mechanization of production processes as well as adoption of an automated production control system ensure precision and smooth operations by all components of Glavtyumenneftegaz. More than 211 million tons of high-specification crude, including 5 million tons above target -- this is the result of the labor of the Tyumen oilmen last year.

"Our work force," states Lenin Prize winner F. Arzhanov, head of Glavtyumenneftegaz, "deeply comprehended the statement made by Comrade L. I. Brezhnev on the urgent need to transition to the second stage of comprehensive exploitation of mineral resources and development of the productive resources of Western Siberia. In the third year of the 10th Five-Year Plan alone we shall be producing more than 245 million tons of crude oil. And this will require drilling through 5 million meters of rock, 1.3 million more than last year, and the development of eight new fields. This is a very complex task. In order successfully to accomplish it, we are placing emphasis on the qualitative factor, on seeking internal reserves. We have elaborated precise organizational and technical-technological measures, and there is extensive competition in progress in labor collectives for unconditional accomplishment of the tough targets and pledges. Performance results for January show that the designated targets will be met ahead of schedule."

The new year is bringing new initiatives. An agreement on competition and productive concord was reached by the brigades of foremen G. Levin and V. Gromov from Nizhnevartovsk. They pledged to drill 80,000 meters of wells apiece during this year. Their example is being followed by others. Komsomol-youth collectives of Engineer-Technical Service No 4 of the Nizhnevartovsk Neftegaz Association, headed by S. Muravlenko, and the drilling brigades of V. Glebov and V. Shchava have issued the challenge to engage in competition for the right to stand honor watch during production of the billionth ton of Siberian crude. Yes, the oilmen of Tyumen' are approaching this production figure. This is a pace unprecedented in the history of this country's petroleum industry.

The largest tributary flowing into the Siberian oil river is the famed Samotlor, which has been brought up to the targeted production level in an extremely short period of time. The other fields in the complex are working with an equal intensity. This means that the tasks assigned by the party are

being accomplished by a well-coordinated effort on the part of all the manpower involved, without wasted effort, in a businesslike and purposeful manner. Heading the competition are the work forces of the administrations of Nizhnevartovskneft' imeni V. I. Lenin, Megionneft', and Belozerneft'. Responding with deeds to the Letter on development of competition in the new year, they have accepted upgraded socialist pledges.

Stages of Growth

This year the work force of the Turkmengazprom All-Union Industrial Association resolved to produce above-target a billion cubic meters of natural gas. This is their response to the party's appeal to make 1978 a year of shock-work labor.

"Each year consists of days, and days consist of events." I heard this from a drilling crew foreman in the Kara Kum, Hero of Socialist Labor P. Shcheblykin. What are these events? The distinguished brigade leader explains: "They were specified by Comrade L. I. Brezhnev at the December (1977) CPSU Central Committee Plenum and in the Letter on development of socialist competition in the third year of the 10th Five-Year Plan: work better today than yesterday, and work better tomorrow than today. This is the formula for a record. And a record is always an event."

There is a special joy in statistics -- the joy of growth. The first two years of the 10th Five-Year Plan are equal to the first four years of the preceding five-year plan for Turkmengazprom. Total natural gas production last year almost reached the figure targeted for the end of the five-year plan, while in the current year this figure will undoubtedly be exceeded.

Last year the date 9 December became a memorable one for the association work force. On that day above-target natural gas for the first two years of the five-year plan went into the pipes. By the end of the year the additional quantity had reached quite a large figure -- almost 4 billion cubic meters. Larger-diameter wells made it possible substantially to increase labor productivity. It rose by 10.4% in two years. This figure represents industrial output growth of 77 million rubles.

The simultaneous-separate production method is by no means new. It has long been employed in various Soviet oilfields. But in most cases it was an experimental method, and therefore limited. But in the multiple-level gas fields of the Kara Kum this method has been employed on a massive scale. One hundred wells have now been equipped with simultaneous-separate production rigs. The new fields are totally equipped with these units. There is clear benefit -- in place of two wells one is operating, extracting gas from different levels. This saves millions of rubles. It is a difficult but efficient technique.

Everybody is working for production efficiency, particularly efficiency innovators. The following are just two efficiency innovators from the thousand-man innovator team: engineers A. Gavriyashev and K. Annakuliyev

from Shatlyk. Last year they submitted 10 suggestions. But savings from these suggestions totaled 150,000 rubles. Effectiveness is inseparably linked with quality.

All these are conspicuous landmarks of yesterday. Tomorrow's, I was told at the association, will be more difficult. Why? New fields with more complex development conditions are being put into production. The natural gas of Turkmenia was always complex. High temperatures and a large quantity of carbonic-acid gas mixed with water released from the gas forms an acid which is destructive to metal. Most of the fields are multiple-level, and small in addition. This means greater complexity not only in production technology and the effort to produce high-quality raw material, but also difficulty in production-developing areas.

These difficulties can be surmounted by only one thing -- intelligent organization of effort. In recent years Shatlyk and Achak, the biggest fields in Central Asia, have become a unique innovation laboratory. Large units with equipment exceeding the productivity of previous equipment by from five to 10-fold were used here for the first time anywhere in the country. Universal gas preparation units were also first employed here. This equipment made it possible almost to double the equipment utilization factor.

Preparations were made yesterday for today's successes in the association. This proved once more that success is not a matter of chance. It must be planned and foreseen. A total of 96 high-yield wells have been put on-line here. In two years, for example, as much gas condensate has been produced in the desert gas fields as during the entire preceding five-year plan. This signifies not only growth in production of a valuable raw material but also growth in the skill of the producers, for the less condensate gets into the main pipeline, the more valuable the gas is.

"Here before me are the pledges of all our subdivisions for the new year," stated V. Talday, the top official at Turkmengazprom. "They were born at the work stations, on the drilling rigs. They are similar in some things, different in others, but everywhere we see the words: 'We shall work without any lagging individuals!'"

And here is a new document of enormous mobilizing force -- the Letter to all the country's toilers on development of socialist competition in the shock-work year of the five-year plan. The concrete lines of this programmatic message, filled with profound meaning, immediately evoked the most lively response from the gas producers of the Kara Kum as well. I glanced through a pile of reports from rallies and meetings in the gas fields. "Our reply is shock-work labor," said the production workers of Achak. "We shall overfulfill the stated target," reported the men developing a new field in Bayram-Ali. Such enthusiasm is noted everywhere. V. Talday stated: "The party appealed to the country and its toilers to make this year an important stage in fulfillment of the five-year plan. And we reply: 'Can do!'"

"The third year," stated P. Shcheblykin, "is our peak in the 10th Five-Year Plan. A very high peak, but we shall conquer it...."

P. Shcheblykin's brigade is one of those which is conquering time in Turkmengazprom. In response to the Letter on development of socialist competition, this brigade intends to usher in the new year 1979 on 7 October. A fine aspiration. Many other work forces are also planning to reach such a performance level. There will be October New-Year celebrations on the sands of the Kara Kum.

3024

CSO: 1822

IMPORTATION OF OILFIELD LABOR ENCOUNTERS DIFFICULTIES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 22 Jan 78 p 2

[Article by V. Noskov: "To Work by Plane"]

[Text] It was noted at the December 1977 plenum of the CC CPSU that in the next 10 years the decisive role in supplying the country with fuel and energy will continue to be played by oil and gas, particularly that of Tyumen'. This year the Siberians are scheduled to provide almost 250 million tons, and 310 million by the end of the Five-Year Plan. No oil region of the country has ever known such gigantic scope and such accelerated growth.

To successfully complete the assigned tasks, the people of Tyumen' need to increase their drilling by 2 and a half times. This would be possible if 180 drilling brigades were available, but there are a total of 83. It is impossible to form almost 100 more units in such a short period. What then is the solution?

The Ministry of the Oil Industry has adopted this solution: to press drillers from Bashkiria, Tataria, Kuybyshev and Saratov into service doing the planned drilling. While in earlier years oil workers came to Western Siberia from other areas not only to work here but to live here as well, the situation is quite different now. The newcomers work on a "duty" basis: they are brought from their towns on the oilfields of Tyumen' oblast and taken back by airplane. This kind of organization of labor is a first for Siberia. What has been shown by the start of the experiment?

I had a talk about this with A. Dzhavadyan, chief engineer of the administration for development of oil extraction equipment, processes and organization of the Ministry of the Oil Industry. He stated with confidence that the new form of labor organization promises to receive widespread use in the development of Siberia and the Far East. The explanation is quite comprehensible: in the older oilfields, fuel yields go down as a result of natural decreases in the reserves. At the same time, a highly skilled force of workers, for which the young developing regions have an acute need, is present there. The ministry issued a special order which spelled out in detail the nature of the duty arrangement and the relationship between the new brigades and the subdivisions of Glavtyumenneftegaz [Main Tyumen' Oil and Gas Administration].

How is this program, developed in industry headquarters, working out in practice? I asked many of the people who started work in the central Ob' region at the end of last year about this.

"The aim is clear," I was told. "It's just that it's being realized in a somewhat different way from what was described in the ministry's order."

How, precisely? The annoyances begin for the "flying" brigades the moment they arrive at the airport. They have to transfer to get to their workplaces. The flight is frequently delayed by bad weather, sometimes by 2 or 3 days. Such situations were covered in the order: facilities for a comfortable rest were to be built at the transfer locations. But there are none yet. People take shelter where they can find it.

Thus, they do not arrive on Tyumen' territory in the best of moods. And how do their hosts greet them? I put this question to F. Sitdikov, deputy chief of a drilling administration in Bashneft'. His group is working on the Savuyskiy field 120 kilometers from Surgut.

"To speak frankly, without any particular pleasure," Sitdikov answered, "and it was easy to understand why. They were required to provide us with everything we needed, and no funds had been allocated for the purpose. Imagine what a situation we found ourselves in when the Siberians had to give us what was earmarked for them...."

According to the ministry's order, Glavtyumenneftegaz and its subdivisions were to provide for the construction of multiple sites for drilling wells and roads to them, as well as supplying the newcomers on a rental basis with equipment, turbodrills, materials and tools. But the people in Tyumen' were unprepared for this, and through no fault of their own. The order to switch to the duty system had not yet arrived at Tyumen' by post when the first brigades from Bashkiria and Tataria were already on the way.

"Some days we do nothing at all," says P. Ulyanov, an installer from Saratov. "They bring us out to the oilfields for nothing, because there aren't any materials available. We sometimes end up standing around because there aren't enough ordinary nails. We're always hearing about interruptions in the delivery of boards, electrodes and metal structural units."

Shortcomings in material and technical supply are one of the main reasons that the brigades who have come here to help the people in Tyumen' still do not feel very comfortable, and their output is considerably lower than that of the longtime residents. Incidentally, this is even written into the newcomers' plans: their drilling targets are 20 percent lower than the usual Siberian norm.

Of course it is necessary to make allowances here for lack of experience and unfamiliarity with local conditions. But a good part of the wasted time is nonetheless connected with purely organizational troubles, mainly with a bad job of providing materials, equipment and transportation. The situation is

made even more complex by the fact that certain local managers are unwilling to share their supplies with the newcomers, saving them instead for "their own" people.

What to do? By way of example, Yu. Aladzhev, deputy general director of the Nizhevartovskneftegaz association, considers that the brigades of newcomers should be absorbed into the subdivisions of Glavtyumenneftegaz. Then there would be no distinction between "us" and "them". I heard the same opinion from other Tyumen' specialists as well. There are assuredly other possible alternatives too. One thing, however, is indisputable: the current relationship between the local subdivisions and the units that have come to help them must be improved.

Many of the newcomers who have done some work in Siberia express a wish to move here permanently. The wish is understandable: many have been captivated by the scope of the work here, and some are drawn by the high wages. There is an additional, far from insignificant, detail: not all of them are glad to spend 14-20 days a month away from their families. The upshot is that they need dwellings.

The pity is that even the workers attached to Glavtyumenneftegaz are poorly provided with apartments. Even if the Siberians start building rapidly, the waiting line for dwellings will grow even faster. Apparently, it was not that the Ministry of the Oil Industry failed to specify the building of houses for people who agreed to be based in Siberia, but that as in the past the main stress was placed on providing the oil workers with boxcars converted into living quarters. But it is for this very reason that there is still considerable fluctuation in the labor force, even in Glavtyumenneftegaz itself. Meanwhile the successful implementation of the next step in the program of integrated development of underground resources and expansion of the productive forces of the Western Siberian fuel and power complex depends to a considerable degree on the resolution of this problem.

There is a further aspect of the situation. It was pointed out at the December 1977 plenum of the CC CPSU that it is important to reinforce economic measures with mass political measures in this great construction project. In this respect too, the complaints of those who have come to work in Northern Tyumen' are justified. In the villages where they live while on duty they have almost no contact with the outside world. They get no magazines, no papers, not even radios. No regular political information work, no lectures or talks on the urgent topics of the day are conducted in the newcomers' brigades. There would be no place to hold them: no converted boxcars with reading and study corners have been provided.

It is true that every new undertaking has its unavoidable costs. Certainly it is impossible to foresee all the shoals which might be encountered in introducing a new type of labor organization. At the same time, it is very important to draw the correct conclusions from the omissions and defects which have shown up in the first stages of the experiment, the more so because according to the plan in the industry's headquarters 40 "flying"

brigades are scheduled to be working in Northern Tyumen' this year. Thus the problem will become even greater.

To make the duty method take root and produce the expected effect, the Ministry of the Oil Industry needs to start by instituting close control over the implementation of its relevant decrees. The local operations leadership and the party and trade union organizations must take a more active position. Only in this way will it be possible to employ extensively in Western Siberia the oil workers from other regions of the country, whose assistance is necessary for the successful performance of the huge tasks which have been assigned to the people of Tyumen'.

8480

CSO: 1822

SEARCH FOR OIL MOVES FARTHER NORTH

Moscow PRAVDA in Russian 19 Feb 78 p 2

[Article by V. Goncharov: "They Storm the Depths"]

[Text] Farther and farther to the north, across the taiga and swamps, stride the derricks of the Komineft' association. The successful development of the Usinskiy and Vozeyskiy oilfields discovered here is in progress. This year alone the oil workers of the Komi ASSR are slated to increase oil extraction by 3 million tons over last year's figure. It has been decided to extract 10,000 tons above plan.

"We have never known such an intense program before," says A. Gumenyuk, the general director of the association. "But from the first day of the year the group has striven not only to fulfill it but to surpass it. In January they extracted more than 12,000 tons of liquid fuel above plan. Things are going excellently in February as well. A rapid pace has been set: this is the workers' response to the Letter of the CC CPSU, the Council of Ministers of the USSR, the AUCCTU and the Komsomol Central Committee. They have launched a competition with the slogan "Work better today than yesterday and tomorrow better than today!"

Here is one of the commitments made by the group: "To perform 55-60 percent of all drilling in the form of rotary drilling..." This is a question of incorporating an advanced process in the drilling of wells, which according to the experts' calculations will increase the drillers' labor productivity by a fifth. In what manner? In such cases the bit lasts 2 or 3 times as long as with the turbodrill, and this means fewer raising and lowering operations, each of which takes several hours. The speed of drilling will be increased and the danger of well deviation considerably decreased. Rotary drilling will soon be incorporated in drilling up to depths of 2,300 to 2,400 meters.

The brigades of A. Vasil'yev, Ye. Pugachev and N. Kovalev were among the first to successfully test the rotary method in the lower sections of wells. The calculated high economic efficiency of the new method was confirmed. Now all foremen are studying this advanced experience; tomorrow they will be employing it on their own wells.

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REFTINSKAYA GRES, MARYYSKAYA GRES POWER UNIT ADDITIONS NOTED

Moscow STROITEL'NAYA GAZETA in Russian 8 Jan 78 p 1

[Articles by Vas. Pankratov and N. Babayev: "Tempos From the First of the Year"]

[Text] Today at Near-Completion Projects

New capacities have gone on-stream at the top-priority construction projects in a number of industries; operations are still brisk: new shops and sections are going up and units are being installed. Today we present a selection of reports from near-completion projects in the third year of the five-year plan period.

Power Industry Workers

Reftinskaya GRES. A 500,000 kW turbounit recently was brought under load here. Builders, installers and operators are erecting the power station at a breakneck pace. From 1970 on, new units have been going on-stream here year after year. When they began construction of the first "500,000-er", six 300,000 kW power blocks had already been humming at full load.

Even so, everything did not go smoothly right away when the bigger unit was under construction. The assemblers got started late in the installation of the more than 8000 ton boiler complex. Design discrepancies and incompleteness in the fabrication of the equipment came to light during assembly. A great deal had to be rectified right on the site. And still, the consolidated brigades led by V. Amelichev, V. Panteleyev and Ye. Yarushnikov did the assembly work far ahead of schedule. They worked under the contract method and reduced the labor outlays in assembly by 1300 man-days.

Even now the Reftinskaya GRES is the Urals' biggest GRES. It delivers a quarter of all the energy in the Urals power grid. Scheduled next for construction are the eighth, ninth and tenth 500,000 kW power blocks. Now the power unit builders have begun constructing the second 500,000 [kW] block; they promised to put it on-stream ahead of schedule, this year. By the end of the five-year plan period, when another two similar blocks will be built, the station capacity will climb to 3.8 million kW.

Maryskaya GRES. The fourth 210,000 kW power block went on-stream at this power station, springing up on the bank of the Karakum Canal.

Now the total capacity of this heat and electric power station, fired with natural gas, reached 840,000 kW.

Before the close of the five-year plan period two more power blocks--of the same capacity--are slated for start-up. The collectives of the Marygresstroy Administration of the Uzbekgidroenergostroy Trust and the subcontracting organizations have begun building them.

Marygres plays a large role in invigorating the economy of the republic. All we need say is that a nitrogen fertilizer plant is under construction not far away. The station current is being fed also to the amalgamated power system of Central Asia.

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WELL CLUSTER DRILLING RIGS SHORTEN DRILLING TIME BY TWO-THIRDS

Baku VYSHKA in Russian 19 Jan 78 p 3

[Article: "Wells Laid Down Fanwise"]

[Text] Specialized rigs for cluster drilling of wells have made their Soviet advent. A consignment of this equipment was dispatched to oil industry workers by the collective of the Uralmash Plant. Thanks to the new equipment today a third of the traditional drilling time is spent in sinking one well. The depths these rigs can command is more than 3000 meters.

"Getting the new equipment into production," said the chief engineer, R. V. Sidorov, of the VNIIneftemash [All-Union Scientific Research Institute of Petroleum Machine Building], "helps sharply boost the labor productivity of oil industry workers and cuts down capital investments in well construction. Cluster drilling of wells was tried first early in the 1960s at the Samotlor field in Western Siberia. Here stretch endless bogs and oil recovery in the usual way--drilling for a single well--is costly. The opportunity of drilling from a single area more than ten wells in differing directions was instrumental in sharply lowering costs and stepped up the field exploitation rates by several times. A Letter from the CPSU CC, USSR Council of Ministers, the All-Union Central Council of Trade Unions and the Komsomol CC directs that the energies of the country's working people be applied to the broad use of these advances in science and technology, as one of the most important conditions for higher production efficiency."

In developing the new rig, scientists drew from the wealth of experience of Tyumen' oil workers. The installation was unitized with standard drilling equipment. It can be hauled to the work site by blocks on specialized transportation.

This year Tyumenskaya Oblast oil workers will receive 60 new rigs; later their manufacture will increase. Five classes of these rigs are scheduled to be operated in drilling wells at different depths. In this way the scale of cluster drilling will be greater. This will help the country's oil industry workers meet the challenges set for them by the 25th Party Congress.

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NEW SCIENTIFIC-PRODUCTION ASSOCIATION FOR THERMAL EXTRACTION OF OIL

Baku VYSHKA in Russian 11 Feb 78 pp 2-3

[Interview with Doctor of Engineering Sciences A. R. Garushev, chief of "Soyuztermneft" Association]

[Text] Oil production is increasing in our country from year to year. This increase is achieved not only by virtue of the discovery of large new deposits, but also by virtue of improvement of the efficiency of the development of oil deposits. Nevertheless, even at the current level of oil production technology, large reserves of the fuel remain in the depths. Therefore, naturally, enormous national economic importance is attached today to increasing yields, to adopting methods which, unlike the so-called traditional techniques, would provide an opportunity to increase the final oil recovery coefficient and sharply reduce unrecoverable losses of valuable fuel and raw materials in the depths of the earth.

Soviet and foreign experience indicates that the most efficient way to attain this goal is to make extensive utilization of thermal oil recovery techniques. With this in mind the Ministry of the Petroleum Industry, on the foundation of Krasnodar NIPIneft' [Scientific Research and Planning Institute for the Petroleum Industry], established the scientific-industrial association on thermal oil recovery techniques, called "Soyuztermneft". The new association came into existence on 1 January 1978. It is headed by graduate of the Azerbaydzhan Institute of Petroleum and Chemistry imeni M. Azizbekov, Doctor of Engineering Sciences Aleksandr Rubenovich Garushev. VYSHKA correspondents K. Vartapetov and V. Gol'tsev asked him to discuss the prospects of the development of thermal recovery techniques, plans of the association and problems it will solve.

"First of all," said A. Garushev, "I would like to stress that it will become increasingly difficult for us to maintain high rates of development of the petroleum industry without adopting the latest techniques for boosting yields. The fact is that a large fraction of industrial capacities, developed in the industry every year, is spent on making up for decreasing yields in low-yield fields. During the Ninth Five-Year Plan, for example, new capacities were placed in operation throughout the

country for producing 354 million tons of crude, of which 212 million tons, or 59.9%, were used for compensating diminishing yields in existing fields. It should be pointed out that the proportion of this crude will increase in the Tenth Five-Year Plan.

"Therefore the most important tasks facing the scientists and experts of the petroleum industry is to develop an extensive, comprehensive program, aimed at increasing the recovery factor. Economists calculate that an increase of yield by only 1% would give the country many tens of millions of tons of extra crude annually, which is equivalent to the discovery of several major oil fields.

"Thermal methods of stimulating formations containing both high-viscosity and standard-viscosity crudes unquestionably occupy a special place among measures aimed at increasing yields. It probably is not necessary to explain the essence of these methods in detail, especially since I know that a lively discussion has been taking place on this subject for the past year on the pages of VYSHKA. I will say only that the basic technological idea of thermal techniques consists in a sharp reduction of the viscosity of crude as a result of heating, which increases its mobility under formation conditions, and should increase the productivity of the wells.

"There are three basic kinds of thermal techniques. They are, first, to heat the cutting face zones of wells with steam, different heaters and with heat released during the course of artificial chemical reactions. The second way is to cyclically or constantly pump various volumes of heat carriers (hot water, steam or hot gases) into the formation, and finally, the third method is in situ combustion."

[Question] We know that the Krasnodar oil people are pioneers in the adoption of thermal oil recovery techniques. What have been the results of these techniques in terms of increasing yields?

[Answer] About that I should like to say, first of all, that the idea of in situ combustion was first propounded by Krasnodar experts back in the 1930's. However, the war delayed the implementation of the concept. The plan began to be implemented in 1966 after comprehensive analyses and preparatory operations, conducted in the Pavlova Gora fields, which contain heavy viscous crude. In the ensuing 10 years the VG (in situ) process increased the yield of the field by an additional 35,000 tons, which is 45.7% of the summary yield since the beginning of development of the field, i.e., since 1957. As of 1 January 1978 the recovery factor of the Pavlova Gora deposit is much higher.

Steam heating techniques have yielded even more impressive results. We adopted these techniques in the Zybza field, Glubokiy Yar NGDU

"Chernomor-neft'" at about the same time we adopted in situ combustion in Pavlova Gora. Various technological schemes for steam heating wells for use under various physico-geological conditions were developed

during the course of demonstration operations, and the equipment necessary for the successful implementation of the process was thoroughly tested. In the decade since the beginning of the adoption of the technique more than 200 wells have been developed and more than 100,000 tons of additional crude have been recovered from the reacting wells. The yields of most wells vary from 5 to 15 tons per day, compared with 0.1-0.5 tons before the process was used. It is also important to note that the cost of the crude recovered from these wells was two, and sometimes three times lower than the industrywide cost.

How effective thermal oil recovery techniques are can be judged on the basis of what I have just said. Based on the data at our disposal, demonstration operations alone, conducted in fields of Krasnodarskiy Kray, Azerbaydzhan, Komi ASSR, the Western Ukraine, Northern Sakhalin, Tatariya and other regions, made it possible to produce about 6 million additional tons of crude.

[Question] You talk about demonstration operations, although various thermal techniques for increasing yields have been employed in the petroleum industry for more than a decade. It seems to us that this period of time is quite sufficient for converting from the demonstration to the extensive industrial adoption of the new techniques in the industry.

[Answer] The adoption of the new techniques, of course, has lagged to some extent. There are many reasons for this. One of the main ones is that the development of thermal oil extraction processes involves the solution of difficult and diverse technical and technological problems, the success of which depends on many sectors of industry, scientific research, planning and design organizations. Furthermore, there are also problems in the development of special equipment. A complex program of measures aimed at increasing the recovery of crude from the depths has been developed. There are programs not only for Minnefteprom [Ministry of the Petroleum Industry], but also for many allied sectors of industry, responsible for the development of machinery, instruments and chemical products, designed both for improving existing recovery techniques and for the development of new technological processes.

[Question] It must be assumed that the founding of the new scientific-industrial association "Soyuztermneft" will promote the implementation of this complex program.

[Answer] Yes, of course!

[Question] What is the structure of the new association and specifically what problems will it solve?

[Answer] Our new association will completely absorb NGDU "Chernomor-neft", to which also will be transferred all thermal recovery technique demonstration sections. We also have several other industrial subdivisions, most notably an experimental-industrial base for building special nonstandard

machinery. The staff of the association will draft plans for developing fields in which thermal methods will be used, design machinery and equipment for carrying out the processes, supervise the outfitting of oil fields and promote the adoption there of techniques that have already been developed at our test facilities.

The problems, admittedly, are not easy ones. We have developed for their successful solution and are using what we call the matrix structure of management of the scientific-industrial activities of the association. The experience that has been compiled in this area by certain scientific-industrial associations of other industrial sectors of the country will be very helpful to us in this respect. The structure essentially amounts to the combining of the efforts of highly qualified experts in various fields for work on a certain assignment or project. In this way the entire "research-production" cycle will be transformed under the conditions of the association into a continuous technological chain, thereby ensuring a sharp reduction of the time required for the development of individual parts and of a new product as a whole.

On the basis of work that we have already completed we are outlining our most urgent tasks and objectives, wherein plans for thermal extraction will be adopted in the current and in future five-year plans. These include primarily fields that contain high-viscosity crude: the Kenkiyan and Karazhanbaz in Kazakhstan, Yaregskoye and Usinskoye in Komi ASSR, the Okha and Katangli on Sakhalin and several others. Experimental sections are already being planned for some of them, a comprehensive program for the construction of producing and forced wells will be prepared, and the technology for performing the process itself is being developed.

Problems of increasing yields in the old fields of Azerbaydzhan occupy an important place in the plans of the new association. I say an important place primarily because of the fact that 48 deposits, in which the steam heating technique can be used, have been identified as of this time in our republic.

The first heating tests were started here, as we know, in 1969 in the Khorosana field. An additional 37,000 tons of crude were produced from 1969 through 1976. That is not a bad figure, but judging by the specific steam consumption per ton of recovered crude, the process is still too inefficient.

A large program of measures will have to be implemented before the efficiency of thermal recovery techniques can be increased at Apsheron wells. We believe that the first thing that will have to be done is to develop deposits there not through the system of old wells, which are no longer suitable even for traditional industrial operations, but through a system of new wells, equipped with the proper machinery, which will provide a stable feed of reagent into the formation and stabilize the operation of producing wells. Of course, we will have to justify the technical plans and projects, debug the machinery at our test facilities and experimental

sections in Azerbaydzhan, and only then can we embark upon the complete implementation of the process in the field. We feel that this approach to the development of oil fields using thermal techniques will be extremely effective.

It is also important to mention the important progress that our colleagues from Azerbaydzhan have made in the adoption of the in situ combustion method. The proponents of this method, the industrialists of NGDU "Leninneft", along with coworkers of VNIIneft' [All-Union Scientific Research Institute of Petroleum and Gas] and AzNIPIneft', have contributed a great deal to the improvement of thermal recovery processes and to the expansion of the scope of adoption. This process is already being used at many wells. In less than 4 years, as we know, several tens of thousands of additional tons of crude have been recovered, and much of that as the result of improvement of the process by way of in situ wet burning. Our association will analyze the experience of the "Leninneft" oil men in the adoption of the VG method in order to consider their results during implementation of similar processes in other oil fields of the country.

[Question] Last year, when the problem of the adoption of fundamentally new techniques for intensifying crude yields was discussed on the pages of VYSHKA, the opinion was expressed that it was important, especially at the Institute of Petroleum and Chemistry imeni M. Azizbekov, to begin training specialists in this field. What is your opinion on this question?

[Answer] I think that this is a perfectly valid question. In fact, it is necessary not only to train engineers who are competent in thermal techniques of developing oil fields and in the operation of the machinery developed for their implementation, but also to instruct operators, foremen and other workers of oil-producing administrations in the utilization of new processes. Only then can we ensure the successful implementation of plans for developing oil fields using new technological processes, and only then can we achieve the desired effect.

I should like to say in conclusion that the new "Soyuztermneft'" association is just taking its first steps and its staff is exerting every effort to make its contribution to an improvement of the effectiveness of the oil industry and to the implementation of the resolutions of the 25th Party Congress and December (1977) Plenum of the Central Committee of our Party.

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CSO: 1822

SUPERDEEP DRILLING IN SEARCH OF FUEL

Baku VYSHKA in Russian 14 Feb 78 p 2

[Article by A. Durmish'yan, doctor of geological-mineralogical sciences, director of the VNIPIGAZ laboratory: "Petroleum and Gas at Great Depths"]

[Text] This is not the first time this newspaper has touched upon problems of finding deposits of petroleum and gas at great depths. The article below by Doctor of Geological-Mineralogical Sciences A. Durmish'yan again emphasizes the urgency of this problem and the necessity of comprehensively stepping up work on creating the material-technical base of superdeep drilling and developing new sources of natural fuel.

As is well known, petroleum and gas occur in the sedimentary layer of the earth's crust, where they fill pores of sandstone, sand, limestone, dolomites, and other types of rocks, forming industrially-exploitable accumulations of hydrocarbon.

The thickness of the sedimentary layer is limited. Within the limits of petroleum and gas-bearing regions it ranges from several thousand meters to 20-25 kilometers. So far, however, petroleum and gas have been found at depths down to 7,000 meters. In connection with this, the question arises: Can we expect discoveries of petroleum and gas deposits deeper down? The question of great interest and relates to resolving vital national economy problems.

In the not too distant future we will have the capability of drilling wells down to 12-15 kilometers. But before sinking such costly wells it is necessary to determine whether petroleum and gas deposits may be found there. All of this makes it necessary to carry out comprehensive research into problems of deep wells, to study the vertical zonality of distribution of petroleum and gas deposits, and determine the geochemical and depths limits of the possible occurrence of hydrocarbon accumulations.

In the world's petroleum and gas-bearing regions, despite extremely varying ratios of petroleum and gas reserves, we find precise patterns governing the occurrence of deposits in terms of area and depth. As a rule, pure gas deposits are encountered at shallow depths--from several hundred to 1,500 meters. The majority of petroleum deposits are found at the greater depths. In our country, for example, the main industrial reserves of petroleum are concentrated at depths between 1,000 and 3,000 meters, although in many cases petroleum deposits have been found at less than 1,000 meters and beyond 3,000 meters. More than 70 percent of the world's petroleum reserves occur within the interval of 1,000 to 3,000 meters. At depths below 3,000 meters, as a rule, we find gas condensate deposits. In essence, these deposits constitute a new type of hydrocarbon accumulation in the ground. They contain vast reserves of natural gas saturated with light petroleum vapors, which is called condensate.

Gas condensate deposits have been discovered at depths down to 6,000 meters in all the world's petroleum and gas-bearing regions, including Azerbaydzhan, and they constitute convincing confirmation of previously determined patterns governing the occurrence and vertical zonality of distribution of hydrocarbons. Down below gas condensate deposits, in the lower stages of segments of sedimentary deposits, we find pure gas accumulations forming deposits of dry gas, known as high-temperature methane.

The presence of high-temperature methane at great depths is expectable, and to a large extent helps to determine the potential of great depths.

The possibility that only natural gas would occur at great depths was raised by Academician I. M. Gubkin. Referring to refinery cracking practices, he wrote that "if we use very high temperatures we can convert all petroleum to gas, within which a main role is played by methane." Later on, Ivan Mikhaylovich drew the important conclusion that "very likely, in nature as well, if petroleum deposits occur under conditions of extraordinarily high pressure or very high temperatures, petroleum begins to break down . . ."

Thus, almost one-half century ago I. M. Gubkin wrote about the possibility of petroleum's breaking down at great depths, disintegration of its molecules under high temperatures, and its conversion to natural methane gas. Subsequent research and deep well drilling have shown that this process takes place in the ground within the temperature interval of 165-200 degrees Celsius, corresponding to depths of 4,500-6,500 and deeper.

The problem of high-temperature methane is a subject of more than theoretical investigation. Dozens of such deposits, including quite large ones, have already been discovered as a result of superdeep drilling in various regions of the world. Prominent among them are deposits discovered in the last 10 to 15 years in the United States, in particular the Delaware-Val Verde and Anadarko depressions. In these two regions alone, between 4.5 and 7 kilometers deep, more than 50 gas deposits have been found, including such large ones as the Panhandle-Hugoton with gas reserves of about

two trillion cubic meters, the Gomez with 420 billion cubic meters, and the Puckett with 234 billion cubic meters. In both depressions it has been found that petroleum deposits disappear almost completely at depths of around 4.5 kilometers, as they are replaced by gas condensate. At depths of 5.5 kilometers or lower, gas condensate deposits give way to pure methane (without condensate).

Discussing thermal decomposition of petroleum, the founder of Soviet petroleum geology I. M. Gubkin believed that "this process ends with complete disintegration of hydrocarbons and the release of hydrogen and carbon." Investigation of this hypothesis by Soviet and foreign scientists has confirmed that hydrocarbons, including methane, under particular temperature conditions decompose completely. At temperatures of around 200 degrees C all hydrocarbons, with the exception of methane, are unstable. Under higher temperature conditions--in the lower stages of the sedimentary cover of the earth--methane also breaks down, leaving only a hydrocarbon residue in the stratum. This process takes place at depths of 10,000 meters or lower, which are the geochemical limits of possible occurrence of hydrocarbon accumulations in the ground. Considering that at such great depths the collector characteristics of the strata also deteriorate, it becomes obvious that prospecting for petroleum can be effective under conditions of depths down to 4.5-5 kilometers, gas and condensate down to 6 kilometers, and pure gas down to 7-8 kilometers. In this connection, it is instructive to note that the United States every year drills several hundred exploratory wells at depths ranging between 4.5 and 6 kilometers and more than 50 wells at depths between 6 and 7.5 kilometers. Moreover, the main purpose of the wells is to search for gas and gas condensate deposits. Up to now, at depths below 5,000 meters, more than 200 deposits of hydrocarbons of various phase state have been found, with a predominance of gas condensate and pure gas. And recently, in the Mills Ranch Field in the Great Basin, an industrial gas flow was struck at 7,875 meters.

Substantially increased volumes of superdeep drilling in our country are justified and completely substantiated, for in a large number of cases the lower horizons of petroleum and gas-bearing regions remain unexplored.

Investigations have found that in many regions of the country, such as Azerbaydzhan, the North Caucasus, Turkmenia and Kazakhstan, Astrakhanskaya, Roenburgskaya, and the Volgogradskaya Oblast, Western Siberia, the Komi ASSR, the Ukraine, and others, the lower, unexplored portion of the sedimentary layer is characterized primarily by enormous prospects for finding reserves of natural gas and condensate. However, the possibilities of finding new petroleum deposits at these depths are limited. The development of superdeep drilling in these regions will undoubtedly promote the discovery of new major gas and gas condensate deposits and the preparation of new substantial reserves of hydrocarbons sufficient to meet our country's planned level of gas production for the immediate and long-term future.

Of special interest are the prospects of deep-occurring horizons in our republic, where the thickness of the sedimentary mantle runs to 20 kilometers and the depth of actual exploration stands at 5,500 meters.

As we know, for a long time, when drilling was limited to depths of 3-4 kilometers, in Azerbaydzhan, including the unique region (in terms of petroleum and gas-bearing potential) while the Apsheron Peninsula, pure petroleum deposits were found and exploited without substantial reserves of natural gas. But as deep well drilling became developed and exploratory work extended to deep-lying structures, a new genetic zone of petroleum and gas accumulation was found, where at depths of 4 to 5.5 kilometers deposits of the gas condensate type were struck for the first time in the productive stratum.

The discovery of such gas condensate deposits as Karadag, Zyrya, Yuzhnaya, Bakhar, Duvanny, Bulla-more, and others made it possible to establish a number of interesting patterns shedding light on the prospects of great depths and the possibilities of discovering new similar fields in the underexplored portion of the republic's territory. It may prove encouraging, for example, to prospect for gas and condensate in structures located offshore in the Southern Caspian. These structures include primarily the Banka Andreyeva, where depths of anticipated gas condensate deposits lie between 5 and 7 kilometers, Shakhovo-more--4 to 7 kilometers, Lokbatan-more--5 to 5.5 kilometers, imeni 28 Aprelya, imeni 26 Bakinskikh Komissarov, imeni 40-letiya Azerbaydzhana, and many others.

The Southern Caspian also includes regions where the discovery of gas condensate deposits is anticipated at depths of more than 7 kilometers (offshore areas imeni Zevin-Petrov, imeni Fioletov, Banka Borisova, and others).

Large accumulations of petroleum and gas are expected in the Mesozoic Deposits of a number of regions in the republic (Kobystan, Apsheron'skaya Oblast, the Kura Depression, Western Azerbaydzhan, and others), where it will be necessary to drill wells between 5.5 and 8 kilometers in depth. However, conditions of occurrence of petroleum and gas deposits there are quite complex, and the geological basis of their prospecting has not yet been sufficiently worked out.

The fast pace of development of our country's petroleum and gas industry requires the preparation of new, powerful reserves of petroleum and gas. One of the main directions in resolving this most important national economy problem is the development of superdeep drilling, the organization of searches for petroleum and gas deposits at great depths. Moreover, it is essential to proceed on the basis that the discovery of petroleum deposits may be expected at depths down to 5 kilometers. Below--between 5 and 7 kilometers, and in some cases down to 8 kilometers, we can expect the discovery chiefly of gas condensate and gas deposits. Depths of 9-10 kilometers must be considered the limit of potential occurrence (existence) of hydrocarbon accumulations. On the basis of these characteristics, the development of superdeep drilling must be viewed primarily as an important means of finding and preparing major reserves of natural gas and condensate.

DANGARA-KURGAN-TYUBE OIL PIPELINE, 70 KM LONG, HALF-FINISHED

Dushanbe KOMMUNIST TADZHIKISTANA in Russian 23 Dec 77 p 1

[Article by S. Takhalenko: "Oil Pipeline in Construction"]

[Text] The country's highest mountain oil pipeline, the Dangara-Kurgan-Tyube, runs along the south of Tadzhikistan. It is 70 kilometers long. The project was prepared by specialists of the Central Asian Scientific Research Institute of Petroleum. Construction is in the hands of a section of the construction and installation administration of the Production Association Tadzhikneft', headed by V. Ignat'yev. Pipe already covers half the route.

The new pipeline is being laid down in very rugged terrain, distant from industrial centers. It runs across the Tabakchi range and cuts eight highways, narrow-gauge and broad-gauge rail lines and uncounted gorges.

Welding and insulation placement are going on from both ends--from Kalinin-Abad and Dangara. Eight bulldozers and two bucket wheel excavators are busy on the route. Shift quotas are being overmet by 1.5 times by bulldozer operator V. Kleymentov and bucket wheel excavator operator A. Petrusenko. Labor productivity of electric welders R. Sultangariyev, V. Korniyevskiy and S. Safin is nearly double the planned target. The insulation workers' team of B. Zakhokhov is far ahead of schedule.

The highest point on the route is the Tabakchi range. Right here along an eight-kilometer segment is where the project calls for most of the drilling and blasting.

"The need has long since appeared for construction of this pipeline," said SMU [Construction and Installation Administration] head V. Mityukov. "The narrow-gauge line is having a rough time freighting oil to the nearest transshipping depot. The pipeline will do more than just clear up this problem: it will cut oil costs by one and a half times through lower transportation charges. The pipeline is set to go into service next year."

Oil recovery from the Beshtentyakskoye field, near Dangara, is growing yearly. Two more wells turned gushers in just this year alone. And there are 11 wells producing here.

URENGOY-CHELYABINSK GAS PIPELINE UNDER CONSTRUCTION

Moscow EKONOMICHESKAYA GAZETA in Russian No 9, Feb 78 pp 1-2

[Text] In the expanses of Tyumen' oblast, natural gas fields are being developed rapidly alongside the development of oil extraction. The world's and this country's first gas fields and main pipelines in permafrost, swamp and tundra regions are under construction. A powerful system of gas pipelines between Urengoy and Chelyabinsk is being built. This year, a main line 1,420 millimeters in diameter from the Vyngapurskaya field to Chelyabinsk is to commence operation. Work is proceeding on the entire 1,500-kilometer course.

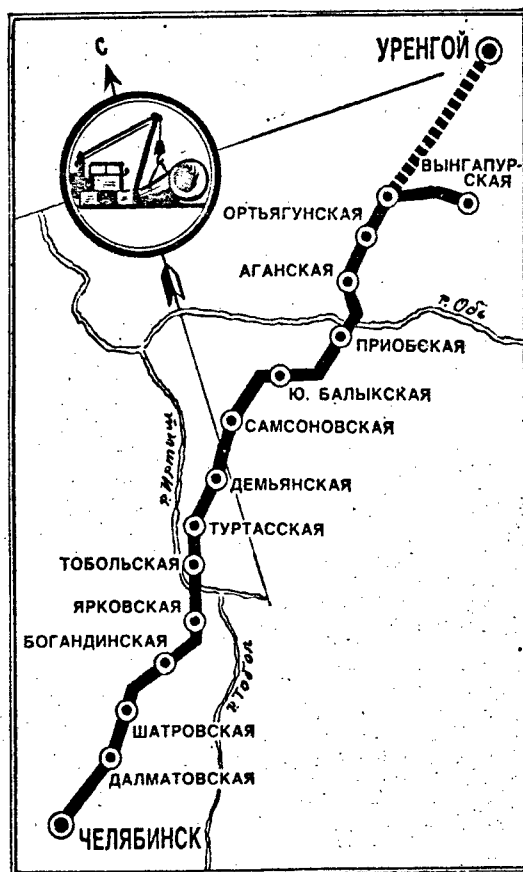
In accordance with the Main Directions for the Development of the National Economy approved at the 25th Party Congress, the structure of the fuel and energy resource balance will be improved during the 10th Five-Year Plan. The gas industry is growing rapidly. Last year, 346 billion cubic meters of gas was extracted in this country--57 billion cubic meters more than in 1975. In the concluding year of the Five-Year Plan an increase to 400-435 billion cubic meters is called for. An important role in the feeding of an increasing quantity of gas to the places of consumption is assigned to the powerful new Urengoy-Chelyabinsk underground main line.

Length of Main Gas Pipelines in the USSR (thousands of kilometers)

Year	1965	1970	1975	1980 (plan)
Total Length (thousands of kilometers)	41.8	67.5	99.2	135.0

In Western Siberia gas fields are being opened up and gas transport systems built at a high rate. For the first time in this country of the world, the complex scientific and technical problems connected with the organization of extraction and transportation of gas in the harsh polar region, an area of permafrost, are being successfully solved.

Not long ago, the "Medvezh'ye" gas fields reached their planned capacity a year ahead of schedule. As he congratulated the participants in this



remarkable victory for labor, Comrade L. I. Brezhnev expressed his confidence that the Urengoy field, with its unmatched supply of natural gas, would begin production in the next few years.

Work is in full swing here: production wells are being drilled, a construction base is being built, the oil field installations are being erected, and a residential town is growing up. This year, 15 billion cubic meters of gas from Urengoy will be pumped through the gas pipeline from Urengoy to Medvezh'ye, now under construction, which is a continuation of the Medvezh'ye-Nadym-Nizhnyaya Tura main line, now already in operation.

But this is only the first step. Scientists and planners are now studying the question of a sharp increase in the size of Urengoy. The aim is to provide for a stable increase in gas extraction of 30 or more billion cubic meters a year, over a number of years. The main transportation route, it is assumed, will be the Urengoy-Vyngapur-Chelyabinsk gas pipeline system. The gas pipeline from the Vyngapur field to Chelyabinsk is to become operational this year. The Vyngapur field is approximately 400 kilometers from Urengoy.

The main line that is being built is viewed as an important stride in technical progress in transportation by pipeline in this country.

An Immense Engineering Undertaking

The plan for the Vyngapur-Chelyabinsk gas pipeline was developed by institutes of the Ministry of the Gas Industry. Its characteristics are unique. Pipes with a diameter of 1,420 millimeters are being laid along the entire course of more than 1,500 kilometers. The working pressure is 75 atmospheres. When the line reaches full development its productivity will be 33 billion cubic meters a year. Some 13 compressor stations are planned along its length. Their total capacity will be 1.1 million kilowatts.

The gas pipeline is being built under especially difficult permafrost and taiga conditions, far from settled areas. Some 716 kilometers of the course is swamps or flooded areas. The pipeline crosses 13 large rivers and more than 300 small and medium-sized streams.

An extremely complex engineering job had to be done, for example, in ballasting the pipeline. The problem is that it has positive buoyancy. Accordingly it had to be weighted or fastened into the trench by special devices to keep it from floating in the swamps and flooded areas.

The plan originally called for installation on the pipeline of 80,000 reinforced concrete weights, the same number of load collars, and 41,000 anchors (special devices sunk in to a great depth), and for setting the pipeline completely in concrete for a distance of about 75 kilometers. In order to decrease the weight of the weighting materials and the amount of off-road hauling, another engineering solution was adopted: the replacement of the reinforced concrete loads by anchoring devices. Comparative tests of various

types of anchors conducted last year confirmed the effectiveness and reliability of this method of anchoring the pipeline.

It is planned to adopt industrial methods in the construction of the compressor stations.

By prefabrication of the construction units and parts and the performance of only the installation work on site, construction time is cut down and quality is improved as well. Calculations indicate that the construction of each compressor station takes 7 to 8 months rather than the normal figure of 25-28.

Total Capacity of Compressor Stations on Pipelines

Year	1965	1970	1975	1980 (plan)
Capacity (millions of kilowatts)	1.9	3.4	6.7	16.2

The builders' task is to assure high-quality work and to guarantee complete reliability of the pipeline during the whole long period of its operation. Better quality welding work is made possible by the use of new machines: the gas-electric "Duga" type and the electro-contact "Sever-1". The latter was developed through the creative cooperation of the Ministry of Oil and Gas Construction, the Ministry of the Electrical Equipment Industry and the Kiev Institute imeni Paton.

Progressive Methods of Work

The plan for organization of labor along the course of the pipeline reflects the most progressive methods and advanced experience of main pipeline construction.

The assigned task is to construct the Vyngapur-Chelyabinsk gas pipeline virtually in a single winter, over 4-5 months. This was dictated by the fact that construction of the line proper [i.e. excluding the pumping stations], especially in swamp and flooded areas, must be completed before the roads become impassible in spring. It can be pointed out by way of comparison that the normal time of construction of such a pipeline is 36 months.

Preparatory work along the right-of-way began last fall. Some 10 general contracting trusts and one production association of the Ministry of Oil and Gas Construction were sent here. Integrated process flows were organized all along the right-of-way. Each of these performed all the work of welding, insulation and laying the pipeline in the trench, and handed over a completely finished section. This flow type of work was done with the aid of advance engineering and technical preparation. Planning on a weekly and daily basis was used.

For the purpose of coordination of labor and operational leadership, three construction regions have been set up. Overall leadership is exercised by a staff stationed in Tyumen'.

Each construction organization draws up special directive schedules based on the overall schedule. These include planned targets for all aspects of preparatory and construction-installation work.

An information system makes possible a full analysis of the course of construction, the identification of bottlenecks in individual sections, and the making of operational decisions to keep work from falling behind schedule. Finally, a system of quality control has a significant place among the organizational measures; three special groups are in charge of it.

The Decisive Period

How are things going in this crash project? The situation here has become extremely tense. At a certain stage in the performance of the main work, weather conditions this winter became extremely unfavorable from a construction point of view. The usual Siberian cold did not set in in the pipeline construction areas for a long period, and it was impossible to bring heavy equipment into the unfrozen swamps.

In addition, many construction and installation organizations of the Ministry of Oil and Gas Construction delayed in bringing in their forces from other parts of the country and did not make proper preparations to carry out the work. This January supplementary measures were adopted in order to assure that the pipeline would become operational at the specified time, the end of the third quarter.

The Tyumen' obkom of the CPSU has formed a special party group which is organizing mass political work among the builders and installers and coordinating the activities of the party committees. As this has helped to heighten the effectiveness of socialist competition and to disseminate innovative experience. The party organizations of Kurgan and Chelyabinsk oblasts, through whose territory the pipeline passes, are actively cooperating with and assisting the crash project.

On the initiative of Comrade Kalenov's welding and installation brigade of the Surguttruboprovodstroy [Surgut Pipeline Construction] trust, Comrade Diduko's welding brigade of the Severotruboprovodstroy [Northern Pipeline Construction] trust, Comrade Yakovlev's insulating and pipe-laying team of the Mosgazprovodstroy [Moscow Gas Pipeline Construction] trust and a number of other units, a competition to successfully complete the tasks and raise the efficiency and quality of work has gotten under way. This competition has taken on an all-embracing character. The suppliers of materials and construction elements, haulers and other subcontractors are also participating in it.

A running account and summation of the results of the labor competition has been started. Winners receive red pennants and are awarded emblems and certificates. When specific tasks are completed on time or ahead of time, bonuses are awarded.

The work is gaining speed. The organizations of Glavsibtruboprovodstroy [Siberian Main Administration of Pipeline Construction] are setting a good example by working at the rapid assigned pace. But overall, the lags behind schedule in construction of the line which were allowed to develop earlier have not yet been eliminated. To complete construction at the assigned time the pipeline must grow by 20-22 kilometers a day. This figure has not yet been attained. In particular, the organizations of Glavzapadtruboprovodstroy [West Siberian Main Administration of Pipeline Construction] are doing unsatisfactory work. The Ministry of Oil and Gas Construction, for its part, must take energetic steps to speed the construction of the Vyangpur-Chelyabinsk main line.

Loads totaling more than 1.5 million tons must be delivered during the construction of the pipeline. The main shipping is being done with maximum utilization of the railroad to Urengoy which is now under construction. On the section between Surgut and Noyabr'skaya station the subdivisions of the Ministry of Oil and Gas construction have few railheads, so that arriving rail cars are being unloaded only slowly.

Along with the operational measures to speed up construction of the pipeline, a number of long range problems in the construction of the gas transport system for delivery of gas from the Urengoy field are still awaiting solution. These include the construction of two more gas lines along the right-of-way to Chelyabinsk during the current Five-Year Plan, based on preliminary calculations. At the same time, there exist other proposals regarding directions for the transport of Urengoy gas. The Ministry of the Gas Industry, the Ministry of Oil and Gas Construction and the other interested organizations must quickly complete their study of this problem so as to lay down a precise work program for the long range construction of gas pipelines.

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ACCELERATED WORK ON NORTHERN CONSTRUCTION SITES

Moscow IZVESTIYA in Russian 28 Feb 78 p 2

[Article by V. Kozlov and Ye. Shatokhin, special correspondent (Tyumen'-Surgut-Nadym-Moscow): "Acceleration in the North; Tyumen'--The Nation's Great Construction Project"]

[Text] The builders came to the Tyumen' area of the North with a wide array of traditional means and methods of operation. But it immediately became obvious that the "southern" way of building up oil and gas fields would not work under the conditions of tundra and permafrost, the lack of roads and the huge distances between construction sites and industrial bases. The extraordinary conditions and the speed with which the work had to be done, due to the need to put northern deposits of natural fuel and raw materials in operation as quickly as possible, required new, also extraordinary means of operation.

Engineers I. Shapovalov and Yu. Permikin decided to perform all the work--from the design to the completed facility--in the mountains and to turn the northern construction sites into assembly bases. They were enthusiastically supported by Yu. Batalin, chief engineer of Glavtyumenneftegazstroy [Tyumen' Main Administration for the Construction of Petroleum and Gas Industry Enterprises]. It is obvious that ideas come into being faster than they can be implemented. But here the interval between the two was minimal. First a procurement assembly section was established by the construction administration headed by I. Shapovalov. Construction engineers involved mechanical engineers in this new kind of work and all of them became assembly engineers together. They decided that large, completely equipped blocks would be built in Tyumen' in the winter while the foundations were being laid at the building sites and that facilities would be assembled there later. The priority project of these progressive workers--the pressing pump station--was built 10 years ago in Tyumen' and was shipped by barge in the spring to the Ust'-Balykskoye oilfield, where it is still operating. Workers were able to build it in one-fifth the specified length of time. The new method was highly commended by experts.

Assembly-block construction won final recognition after the first gas-collecting point in Medvezhyy was started-up in record time. Norms allocated

22 months for the erection of this kind of large, highly mechanized and automated complex. The builders and installers of the northern subdivisions of the USSR Ministry of the Construction of Petroleum and Gas Industry Enterprises, in conjunction with gas workers, were able to complete the work in 4 months!

West Siberia has undergone a complete transformation in the last 10 years. A powerful oil and gas industry has grown up here, roads have been laid, and cities and settlements have sprung up in previously uninhabited areas. People's horizons have been broadened. The small procurement assembly section of the construction administration has now become the huge Sibkomplektmontazh Construction and Installation Association, where one brigade can now erect more facilities than the entire construction and installation administration did in the past. Our old friends Yu. Permikin and I. Shapovalov now head large organizations. Today the former is the general director of Sibkomplektmontazh and the latter is the head of the Sibzhilstroy Association. One builds industrial facilities and the other builds residences, schools, hospitals and clubs. And their constant supporter, Yu. Batalin, is now the first deputy minister of the construction of petroleum and gas industry enterprises and is still an enthusiastic advocate of innovations.

With Yu. Permikin, we visited the plants in Tyumen', where the silvery block-units are built and "filled" with equipment and technological fittings, and the construction sites of the north, where these blocks are used to build petroleum transfer, pumping and compressor stations and other industrial and power engineering facilities. Here, we became convinced once more that the enthusiasm of the early years has not waned in the slightest, even though the work has become habitual.

"During the first stage in the construction of the West Siberian complex," said Yu. Permikin, "we proved that construction in the North had to be industrialized. Working with scientists and designers, we developed reliable blocks that could be conveniently shipped by any means of transport. We were able to save a great deal of time in the building process. Besides this, there has been a dramatic reduction in manual labor and, consequently, in the number of people working on construction sites. The material-intensiveness of stations is now one-ninth of what it was and the quality of construction and installation work has improved dramatically."

How effective is the assembly-block method in general in comparison to traditional methods? Economists have cited the following data. There is a savings of 380,000 rubles for each million rubles' worth of construction and installation work performed. The association will perform 250 million rubles' worth during the Tenth Five-Year Plan. This means that Sibkomplektmontazh will save the state 95 million rubles, which can then be used for other purposes. If we add the funds saved due to the reduction in the number of workers in the North, the figure rises considerably. It has been calculated that the maintenance of each worker in the northern

latitudes costs 17,000 rubles more a year than worker maintenance in the nation's central regions. The annual savings of this "second order" of just Sibkomplektmontazh is therefore almost 20 million additional rubles.

The new technical designs have made it necessary for installers to find ways of improving the organization of labor. The first collective in the association to transfer to the use of the brigade contract was that of M. Buyanov, recipient of the State Prize of the USSR. This example was followed by the brigade of Yu. Kil'dyushov. It turned out, however, that operational conditions required more than this. Therefore, the brigade contract served as the basis for the origination of the flowline method for the construction of oil transfer and compressor stations. This means that a collective concludes an agreement covering all projects for the year rather than just one project. This makes it possible for brigades to maneuver manpower and equipment more efficiently: While the installation of one station is being completed, the first stages of the work on a second can be conducted while technological pipelines are simultaneously laid on the site of a third.

What form does this take in practice? A brigade consisting of 48 members, each of whom has mastered three or four related specialties, is divided into three links and simultaneously works on several projects. Naturally, this principle has been made possible by the fact that it is based on a high degree of industrialization in construction or, in other words, on the assembly-block method. Here are the results of the work performed by the brigades of M. Buyanov and Yu. Kil'dyushov according to the new method: During the anniversary year, each of these brigades built and turned over four petroleum transfer stations and each completed one station to be turned over during the current year. This is an operational volume which was previously only within the power of an entire trust. Besides this, all of these facilities were given high evaluations. Both brigades fulfilled their assignments for the first 2 years of the Tenth Five-Year Plan ahead of schedule and will complete their 3-year assignments by the date of the first anniversary of the new Constitution of the USSR.

Much was done to industrialize construction in West Siberia during the first stage of the development of this complex. The current rates of oil and gas production have largely been made possible by a bold and innovative approach to the problems posed by the North for builders and installers. Even more will have to be done during the second stage. New deposits are being developed and new pipelines are being laid. Specialists justifiably feel that one of the misfortunes of past years has been the delay in the construction of units for the comprehensive preparation of gas and pressing, pumping and compressor stations. This has led to the underutilization of capacities and has reduced the yield from capital invested in construction.

The need for the balanced and uninterrupted laying of pipe and construction of surface arteries will be emphasized during the second stage. And here most of the responsibility will be borne by the workers of Sibkomplektmontazh: The rates of construction can only be doubled if they contribute more to the

work. How can this be done? The problem cannot be completely solved by means of a mere increase in the production of block-units: A considerable amount of work still remains to be done on the construction sites and, what is even more important, transportation plans are becoming increasingly complex.

The first generation of assembled block structures, weighing up to 60 tons, will be succeeded by a second generation of up to 300 tons. This will involve the construction of superblocks at plants for the assembly of stations or even the construction of facilities that are totally ready for operation. Association specialists have found ways of transporting these gigantic units: They are set on floating cranes fitted out with the necessary technological systems and equipment. These provide a reliable way of floating the superblocks to their designated location.

Tyumen' workers feel that the standardization and miniaturization of equipment for the block-units is another, equally important way of increasing the efficiency of the assembly-block method. Association designers are now adapting the designs of various institutes to meet their own requirements. And these requirements must be taken into account from the very beginning; the power of units must be increased without any increase in size or any change in the spatial layout in the block-units. Specific designs and experimental models of small but nonetheless more productive equipment have already been worked out for units for the comprehensive preparation of gas. For example, a gas separation unit, which will fit into a block-unit half the size of a trolleybus and will replace a huge installation as high as a five-story building, has been developed by a group of the association's designers headed by V. Nelepchenko. Its efficiency has been proved but its fate is still undetermined. The Ministry of the Gas Industry has not insisted that its production be organized by the Ministry of Chemical and Petroleum Machine Building. And this ministry has no plans to manufacture this kind of "petty item" because it has no motivation for this: Its production volume is calculated in tons and rubles.

We asked the general director of the Sibkomplektmontazh Association why blocks which are only partially equipped or which are not equipped at all are still frequently delivered to construction sites. He replied that time is rushing by while the client and supplier are standing still. The USSR Ministry of the Gas Industry still times the delivery of equipment to coincide with the date when facilities become operational. The work should be organized in such a way that equipment and all necessary materials for large-block construction would reach the plant early, just as metal structures and aluminum for the facing of the block-units.

Specialists feel that the best solution to this problem consists in the direct outfitting of the association's plants with equipment and materials without going through the clients--the USSR Ministry of the Petroleum Industry and Ministry of the Gas Industry. This could reduce the amount of time required for the installation of petroleum transfer and compressor

stations by 15 percent. This does not mean that there is not enough of the necessary equipment. No, the construction plan and resources are quite well balanced. Interruptions in deliveries are due to the large number of departments involved in this process and to the slipshod work of the middle link in distribution. There is now an urgent need to eliminate intermediary parties in the transmission of orders and equipment.

Assembly-block construction has become the general operational policy in more than just the construction of petroleum and gas industry enterprises in West Siberia. The floating "Severnoye siyaniye" electric power stations, manufactured for northerners by the Tyumen' Shipbuilding Plant, represent nothing other than a superblock completely ready for operation. Drilling rigs are also being assembled from enlarged sections. Many elements of this method are also employed by the builders of homes. Plants of the Sibzhilstroy Association have begun to manufacture shower blocks. All of this is permitting the Siberians to achieve a high level of production efficiency, a dramatic reduction in the length of construction work, improvement in the quality of this work and great savings.

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GEOPHYSICS CONFERENCE IN BAKU

Baku VYSHKA in Russian 26 Feb 78 p 2

[Article: "Geophysicists Make Predictions"]

[Text] The international conference of specialists in geophysics from the CEMA nations, which was held in Baku and lasted several days, has come to an end. Representatives from Bulgaria, Hungary, the GDR, Poland, the Soviet Union and Czechoslovakia summed up the results of joint scientific research projects and agreed on an operational plan for coming years.

The practical significance of the topics of discussion was explained to an AZERINFORM correspondent by G. N. Gogonenkov, chief engineer of the Central Geophysical Expedition of the USSR Ministry of the Petroleum Industry:

"It is no secret that the discovery of a fuel deposit is preceded by a great deal of painstaking work. First the geophysicists determine the structure favoring the accumulation of oil and gas, and it is only after this that exploratory wells are dug. It is good if a fuel deposit is found during the drilling process, but there are times when the structure turns out to be 'empty.'

"Is it possible to determine the nature of rock and even to try to predict whether it contains oil and gas before wells are dug? This matter is of central concern to those who attended the meeting of geophysicists from the socialist nations. We told our colleagues about the first positive results of using the new method of geophysical investigation.

"Using the latest equipment for the charting of seismic signals and digital computers, we pinpointed locations of gas and oil deposits in the Russkiy Khutor zone of Dagestan. The commercial flow of blue fuel comes from a depth of 2,200 meters. We have now decided to test this method in West Siberia. During the next stage in our experiment, we geophysicists will draw up a plan of the structure of wells for drillers and will determine the best way of drilling through rock. This will reduce the cost of exploratory drilling and will increase production efficiency, which is stressed in the decisions of the 25th CPSU Congress.

"Our methods are intended for the exploration of fuel deposits on dry land. As for off-shore deposits, new equipment is now being prepared, for example, for the Caspian. Effective exploration of the marine depths will begin with the use of this equipment."

DRILL PIPE ACCIDENTS, BREAKAGE, CORROSION

Moscow PRAVDA in Russian 28 Feb 78 p 2

[Article by M. Safiullin, deputy head of the Tyumen' Main Administration of the Petroleum and Gas Industry (Tyumen')]: "Where Metal 'Flies'"]

[Text] Deplorable incidents of the following kind can frequently be seen at oil deposits in West Siberia: When drillers have only the last operations to perform before a shaft has been completely sunk, they raise the instrument to replace a worn-out bit and suddenly the drill pipe breaks. This is a serious mishap which requires a great deal of time and energy to correct. A well which might be producing oil stands idle for weeks or even months. Sometimes the damage cannot be corrected. Then a new well has to be dug. Each time, the state loses hundreds of thousands of rubles and our industry loses hundreds of tons of metal and thousands of tons of oil.

Drillers have their own special term for this kind of accident: the "flight" of the string. Unfortunately, these "flights" occur even more frequently with other types of pipe than with drill pipes. Here are the two latest examples. At Well No 16 of the Kholmogorsk Administration for Drilling Operations, the oil string broke when it was being lowered: 1,682 meters of pipe "flew" into the well. Another accident occurred at the Nizhnevartovsk Administration No 3 for Drilling Operations. Here the casing string also "took flight." But this was not merely because one of the pipes broke, but because the sleeve was fitted on crookedly at the plant. During the last 3 years, Glavtyumenneftegaz [Tyumen' Main Administration of the Petroleum and Gas Industry] has suffered 100 drilling failures due to poor-quality pipe. More than 40,000 hours of work has been done to eliminate the possibility of this kind of misfortune. Accidents and defects have caused the main administration's drilling operations to fall 200,000 meters below the possible figure. Direct losses can be measured in sizeable figures and have an extremely serious effect on production costs. Accidents have prevented the state from receiving around 2 million tons of the most valuable raw material that is so necessary to the national economy.

The main suppliers of casing string to Glavtyumenneftegaz are the Taganrog and Rustavi metallurgical plants and the Azerbaydzhan and Nizhnedneprovskiy

pipe-rolling plants. Their products are not always of the best quality. On the average, 7.7 percent of the pipe received from these plants has to be rejected. Considering the fact that the enterprises of the main administration will need more than 200,000 tons of casing strings in this year alone, this means that around 20,000 tons will be rejected. And, after all, the amount of exploitation drilling done in West Siberia is growing. Next year, we will already need 320,000 tons of pipe. This is why the present state of affairs is becoming intolerable. But what is the main reason for the poor quality of pipe?

Above all, it is the fact that metallurgical and pipe-rolling plants produce casing string with an angular thread, which does not meet today's technical requirements. Casing strings are generally delivered to oilmen with substantial threading defects and with rejects which should never have left the plant.

The problem is that the basic indicator of the supplier enterprises is the tonnage of pipe rather than its length in meters. Quality is often forgotten in the race for tonnage. As a result, many scarce products are deliberately lumped in with waste products. This has been the case with pipes as well.

"In their own defense," Tyumen' workers have been forced to set up special entrance control systems. After casing pipe has been checked in the plant, drilling administrations and production and technical bases for the maintenance and assembly of equipment have to conduct their own inspection of the pipe and prepare it for operation. This takes time and additional production capacities and takes people away from their assigned duties. But it has been necessary to pay this price; otherwise, drilling accidents would occur on a mass scale.

At the same time, it is becoming more and more difficult to establish reliable control systems. The drillers work in the taiga and on the site of remote deposits, where there are neither bases nor shops for the inspection, preparation and repair of pipes. For this reason, even the huge amount of time spent on the additional inspections does not insure drilling enterprises against "flights" of the string into the shaft.

Oilmen have repeatedly requested the USSR Ministry of Ferrous Metallurgy to change the obviously outdated standards and to begin the production of casing pipe with a trapezoidal thread in place of the present angular thread. Metal workers have acknowledged the validity of this complaint, but the matter has not gone beyond this as yet. In 1977, the amount of pipe rejected in the main administration did not decrease, but, on the contrary, increased. We have levied particularly serious complaints against the collective of the Azerbaydzhane Pipe-Rolling Plant, located in Sumgait. The poor quality of this enterprise's products was the cause of the drilling accidents in Kholmogorsk and at the third Nizhnevartovsk Administration for Drilling Operations.

Many pipes become inoperable during their shipment to the oilfield. This is because the pipe joints are usually protected by polyethylene safety caps. This has proved to be efficient in the nation's southern regions. But in Siberia the pipes are in freezing weather most of the year. Before they ever reach the drilling site, they have to survive several transshipments. In low temperatures, the polyethylene caps break easily and the joints are then left unprotected. Glavtyumenneftegaz has been insisting for several years that all pipe of 168 or more millimeters in diameter be shipped in baling material and that pipe joints be protected by metal rings and nipples. But metal workers have not responded to these requests.

The problem of protecting pipes against corrosion and paraffin build-up is of equal importance. The modern metallurgical enterprise would have no great technical difficulty in coating pipes with a special compound to prevent paraffin from accumulating on the walls of the pipe during exploitation drilling. Oilmen have turned to metal workers with this request, but without any success.

As early as 1968, a paint and varnish shop, capable of coating 100,000 meters of pipe each year, was opened in Surgut. The work in this shop is difficult and labor is organized in the most primitive manner, but there is no other solution to the problem.

We would like to believe that metal workers will concern themselves with the problem of improving the quality of their products. In 1977, many millions of meters of exploitation wells were drilled by Tyumen's drillers alone. This year, the figure will increase by around 50 percent. Under these conditions, the significance of each working well increases dramatically. This is why oilmen must have the latest and most reliable equipment at their disposal. Our metallurgical industry is fully capable of organizing the production of this kind of equipment.

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SECONDARY FUEL FORMATIONS INVESTIGATED

Moscow IZVESTIYA in Russian 28 Feb 78 p 1

[Article by F. Manasypov (Kazan'): "Deep Drilling"]

[Text] The first well drilled in the Tatar ASSR at the Romashkinskoye Deposit passed through 5,100 meters of the earth's crust.

The 53-meter openwork steel beauty of a derrick, weighing more than 200 tons, is strong and substantial. It is assisting geologists in the study of the processes by which minerals are formed in the "ground floors" of the earth's core and natural patterns of their distribution.

At one time, the map of Tatar oil deposits looked like a chess-board with many "blank spaces." Now it is impossible to find even a miniscule unexplored spot on this map. Does this mean that all of the underground stores have been found? Not at all--the deep horizons remain unexplored.

The spot chosen for drilling the first so-called parametric-orientation well is on a hill near Al'met'yevsk.

The new exploratory program for studying the content of secondary formations of oil or natural gas in the "ground floors" of deposits, drawn up by the Sector for the Geological Study of the Crystal Foundation of the Kazan' Branch of the Tatar Scientific Research and Design Institute of Petroleum in conjunction with the Order of Lenin Tatneft' Production Association imeni V. D. Shashin, envisages in-depth study of the geological structure of the earth's interior at three successive points.

The deepest well--7,000 meters--is to be drilled at the Novo-Yelkhovskoye Deposit.

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UKRAINIAN MINERS TELL ABOUT ACHIEVEMENTS

Moscow IZVESTIYA in Russian 13 Jan 78 p 1

[Article with comments by P. Lisnyak, I. Strel'chenko and P. Marosin:
"Horizons of Ukrainian Miners"]

[Text] Defining the significance of coal in the economy, V.I. Lenin called it the true bread of industry. This description remains true even today. At the December 1977 Plenum of the CPSU Central Committee and the 8th session of the USSR Supreme Soviet it was discussed that this year the country's miners have to extract 746 million tons of coal, which will be used for the needs of thermal power engineering, metallurgy, and chemistry. One-third of this colossal extraction will be provided by miners of the Ukraine, and particularly the very old Donets Basin.

Inspired by the decisions of the 25th CPSU Congress, miners of the republic are battling successfully for realization of the plans of the Tenth Five-Year Plan.

Double The Norm: P. Lisnyak, cutter at the mine imeni Artem of the Artemugol' Association, Hero of Socialist Labor

We all understand well that the might of the homeland is created first of all by the efforts of all workers. Responding to the decisions of the 25th congress of the party, like my comrades, I made high socialist pledges. And things are going well for us. By the anniversary of the Great October Revolution, for instance, I cut 7,145 tons of high-quality coal, 3,803 tons of this above the plan.

Responding to the appeal of comrade L.I. Brezhnev to close the labor gap of the anniversary competition I pledge to fulfill my personal five-year plan by the 108th anniversary of the birth of V.I. Lenin, and to cut a total of 4,036 tons of coal in 1978. I think that I will be able to manage this pledge successfully. Since the first days of 1978 instead of 9.3 tons of fuel according to the norm I have been producing 19-20 tons

per shift. Working in the same way are many other masters of extraction such, for example, as V. Borshch, I. Lukakhin and dozens of others. A high rate also distinguishes the collectives of sectors where they are using more modern equipment than the pick-hammer, and namely the AShch and ANShch [expansions unknown] complexes. Almost half of the total mine extraction comes out of faces equipped with these machines.

At High Limits: I. Strel'chenko, chief of a section of the Trudovskaya mine, Hero of Socialist Labor, deputy to the USSR Supreme Soviet

In the past year A. Polishchuk's brigade with our section for the first time in Donetskaya Oblast extracted a million tons of coal in a year. This was done under complex mining and geological conditions, utilizing not hydraulically operated, but individual timbering. Now the brigade has pledged to make this record the norm of its work. It has been decided unanimously to extract not less than a million tons of coal per year.

We are doubly pleased because today, when the demand for our output has risen, we are producing the greater part of the daily extraction of the whole mine. A sense of high responsibility for the fate of the five-year plan at the mine, the section, in the brigade and at each job site will help the Trudovskaya miners to move ahead and gain new frontiers.

Contribution to the Five-Year Plan: P. Marosin, deputy minister of the coal industry of the Ukrainian SSR

Miners of the Ukraine marked the past year with a record extraction--217.2 million tons of fuel, including 4 million above the plan. Meeting the socialist obligations were miners of the associations of Donetskgol', Shakhterskantratsit, Krasnodonugol', Pavlogradugol' and Ukrzapadugol'. The collectives of 62 mines, 374 extracting sections and 700 extracting and tunneling brigades completed the plan for two years of the five-year plan ahead of schedule. Among the best are the Trudovskaya mine in Donetsk, the mine imeni 60-letiya Velikoy Oktyabr'skoy sotsialisticheskoy revolyutsii in Shakhtersk, the mine imeni 50-letiya SSSR in Krasnodon, the Pavlogradskaya mine in Pavlograd and others. They are continuing to work successfully in 1978.

Miners of the Ukrainian SSR are armed with mighty extracting and tunneling equipment. There are 138 drifts equipped with complexes providing a 1000-ton loading per day, and combines on a high-speed regime are operating at 160 entry faces. By the end of the year in the republic there will be 180 drifts with a 100-ton load and 182 high-speed entry faces. The front of the active extracting line exceeds 252 kilometers. On this line 500 mechanized complexes will cut coal.

Being developed widely among the miner collectives is the competition for fulfillment of the plans for three years of the five-year plan by the first

anniversary of the new USSR Constitution, started in the Donets Basin by miners of the Voroshilovgrad Mine Administration imeni Lenin, the Dcbropol'ye Belozerskaya Mine and other collectives.

Valuable initiative was shown by A. Belikov's brigade from Makeyevka, M. Vasil'yev's brigade from Krasnodon and N. Skripnik's from Krasnyy Luch. These collectives pledged to lower the prime cost of each extracted ton of coal by 10 kopecks. Their initiative has already been taken up by dozens of brigades.

The competition of coal workers of the Ukraine is becoming more extensive from day to day. The collectives have taken on themselves high obligations and, without losing time, are fighting for their fulfillment, in order to give the country more high-quality coal with smaller labor outlays. The miners are showing once more by their selfless labor that the cause of the five-year plan is their own, vital cause!

Donetsk

10908
CSO: 1822

PROCESSING KANSK-ACHINSK COAL

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Dec 77 p 2

[Article by Yu. Luganskiy: "Precious Brown Coal"]

[Text] The statement that stoking a furnace with coal is like burning money has long since become true, for coal is not only a source of heat but also a chemical raw material, containing a number of valuable components.

Work is in progress during the current five-year plan on accelerated development of the Kansk-Achinsk fuel-energy complex. The targeted scale of utilization of local fuel resources is unprecedented. In the future the figure will be 1 billion tons of lignite per year.

Fuel could also be hauled from here to the European part of the country, where many customers could be found. But lignite contains considerable moisture, while its friability and spontaneous combustion capability mean losses and considerable difficulties in transport. And finally, is it good economic management to utilize Kansk-Achinsk coal solely as fuel?

"All these problems can be solved," states A. V. Bazhenov, in charge of the energy process engineering shop at Sverdlovsk TETs No 1. "The unit we have developed makes it possible to make lignite much more useful for industry and power engineering." The shop where the experiments are being performed is located in a building housing a former power generating plant on the banks of the Verkh-Isetskiy Pond. The installation, which runs through all seven floors of the shop, has been developed in the Sverdlovskenergo Administration system, with scientific supervision by the Power Engineering Institute imeni G. M. Krzhizhanovskiy.

"Its principle of operation is extremely simple," explained institute project manager E. A. Sokolov. "Lignite is heated without oxygen in a so-called fluidized bed, which ensures a high-intensity process, and breaks down into its components. One of these components is semicoke."

Beakers containing a black granular substance were lined up on stands in the shop laboratory. This substance was semicoke. The new fuel has many advantages over lignite. First of all, its calorific value is considerably

greater. Second, it contains less moisture. It can be briquetted and hauled great distances in that form.

But there are many other advantages as well. Studies were already being conducted which proved that in a number of instances semicoke can also be utilized in the metallurgical process, in particular when sintering ores of ferrous and nonferrous metals, for partial metallization of iron-ore pellets, etc. And this opens up new prospects for the Kansk-Achinsk coal.

"In addition," noted Bazhenov, "semicoke is a good and cheap adsorbent, which is also of considerable importance for industry. Customers are already clamoring for this product."

Other products obtained from processing lignite in this unit are tar and fuel gas. The latter can also be utilized as a high-calory fuel. And the tar contains a number of valuable components, such as benzene and phenol, which are valuable to the chemical industry. Their extraction promises many additional benefits.

The unit in Sverdlovsk should provide answers to questions not only on how best to utilize the Kansk-Achinsk coal but also what the new industrial process should be. Results are encouraging.

The installation itself consists of two containers of impressive size -- a reactor and a coke heater, connected by pipes for transfer of the fuel in process. There are sensors and instruments everywhere, for the process requires additional careful study, improvement, and determination of the parameters which will be employed in industrial units.

It is also important to learn all the peculiarities of the new fuel: boiler furnaces should be adapted to its combustion. There is already reason to believe that it will be possible to reduce the amount of oxides of nitrogen ejected into the atmosphere, thus reducing air pollution.

A successful solution to the problem of processing Kansk-Achinsk coal will open up new prospects for development of this field. Scientists and specialists have now entered into serious discussion on the possibility of setting up large enterprises of a new type. They will consume lignite and produce semicoke, gas, chemical products, and generate electricity. They are even specifying the possible characteristics of the energy combine of the future: consumption -- 50 million tons of coal per year; production -- 9 million tons of tar-containing coke fines, 4 million tons of briquettes, 2.5 million tons of furnace oil, power generating capacity 5 million kilowatts. These are the prospects being opened up for the "low-grade" Kansk-Achinsk coal by the Sverdlovskenergo and power engineering institute people.

Of course there still remain many difficulties in the area of thermal-processing solid fuel. Different variants are being tested, and adjustments are

being made. The scientists and specialists are working hard to achieve better coordination of efforts, to increase the work pace and to involve additional teams of researchers in solving the great many problems which arise. But there is no doubt now that the road toward exploitation of Siberia's fuel resources has been designated.

3024

CSO: 1822

COAL INDUSTRY EQUIPMENT PROBLEMS DISCUSSED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 8 Dec 77 p 2

[Article by G. Dorofeyev, Gorlovka: "Dust on the Machines"]

[Text] Every year in the union Ministry of the Coal Industry plans are compiled for increasing production of new equipment, but a whole series of entries is not carried out regularly. Today the miners as before are feeling sharply the need for spare parts and for new mechanisms. The explanation for this is that at coal machine building plants there is not enough production area.

"The complaints of the miners are well-founded," states the chief engineer of the Gorlovka Gormash Machine Building Production Association, A.A. Chichkan, "but the capacity of the plants is limited. We are working with the maximum load."

How can this be? Let us try to look into it.

The Gorlovka Gormash Production Association is the largest enterprise for production of mining equipment. Produced here are almost all types of coal combines, hoists and other mechanisms. Here they also manufactured the promising new unit, the BUG-3, which now... is not being produced.

Two large white buildings stand immediately behind the central passageway. These are the third machine and assembly shops. They both went into operation at the end of last year and they are equipped, as they say, according to the last word in technology.

Installed in the third machine shop are 102 units of equipment. Many assemblies have programmed control and are capable of performing very complex operations for machining parts. One thing is not clear: why is a third of the units not operating? On one of the machine tools is a thick layer of dust. Obviously, human hands have not touched it for a long time now.

The unit was acquired in January and 100,000 rubles was paid for it. It was installed and adjusted two months ago, but up to now not one part has been machined on it.

"Our shop is young," explains its chief, L. Krasnozhon. "We are just assimilating the production capacities, and we are overfulfilling the plan."

However, if the plan is overfulfilled under the condition that a third of the equipment stands idle, one asks: what kind of a plan is it? It is clear that it was compiled without considering the production potentials and reserves.

And this is not an isolated example.

The hydraulics shop is located in a three-story building. Installed on the first floor are 41 aggregates. Working here in the second shift is a total of 12 machines.

"It is not necessary for us to work more," states the senior foreman of the bay, A. Vinogradskiy, "our shift is coping with the whole program."

The same picture can be observed in the first shop. Here very recently two specialized technological lines were created for manufacturing shafts and gear-shafts for coal combines. These lines were fitted with the latest equipment with programmed control. However the equipment practically is not loaded. Even in the first shift up to 30 percent of the equipment stands idle. In the second shift 12 people instead of 20 are working.

The fate of the assembly shop has proved to be complex. It went into operation in December of last year. More than 6 million rubles was spent to erect it. The document about acceptance of the production capacity for assembly of 1,380 coal combines per year was signed by the chief engineer and the deputy director of the production association for capital construction, A. Chichkan and N. Krasovskiy. Now no one remembers the circumstances in which the builders turned over the project to the operators. But there are grounds to assume that this took place without considering the interests of the matter. Only by this is it possible to explain that the shop, accepted with a "good" evaluation, has not gone into operation up to now. In the shop they have not made one assembly of lines for putting together the reduction gears feeding the parts, they have not completed construction of the parts warehouse and much else.

Thought was given to reconstruction of the seventh shop, but this also fell through. This cost the collective dearly. In 10 months it underproduced for the miners about 50 combines, and more than 100 workers left the shop.

For a long time now the foundry has not met the needs of the plant. It cannot be said that such a situation does not disturb anyone. At the

enterprise an annex to the cleaning action is being built, different types of commissions from the USSR Ministry of the Coal Industry have started coming here, and good decisions and resolutions are being made regarding improving the association's work. In June, for instance, there was a visit from the deputy minister of the coal industry of the USSR, V.P. Gerasimov. He held a technical conference, where the question of the fastest possible putting of underway projects into operation was discussed. In the resolution adopted it was described precisely who should do what in order to put the new capacity at the cleaning section into operation by the first of September. However, this work has still remained undone.

In August the question of putting a new capacity into operation in the foundry was taken up at a meeting of the bureau of the Tsentral'no-Gorodskiy Rayon Committee of the Communist Party of the Ukraine of the city of Gorlovka. In October the secretary of the association's party committee, V.P. Shuteyev, was called (and this is not the first time) to the Donetskaya Oblast Committee of the Communist Party of the Ukraine. After returning he reported that there was unfavorable talk about the unsatisfactory work of the association.

As we see, serious talks are being conducted about the state of affairs at the enterprise. However, the matter is not going further than this. The collective of the Gorlovka Gormash Machine Building Association is continuing to work poorly. Since the start of the year the country's miners have failed to receive equipment worth almost 3.5 million rubles. Explaining this by the absence of the necessary capacities, to put it mildly, is frivolous. The capacities are there. But so far there is not the proper concern about their efficient utilization.

10908
CSO: 1822

BRIEFS

"SOYUZ" PIPELINE--In the third quarter of this year, construction of the entire linear part and six compressor stations of the Soyuz gas pipeline (Orenburg-western border of the USSR), which is being constructed with the participation of CMEA member countries, will be completed. The construction of dwellings and social and domestic projects will be completed at the same time. Delivery of gas to CMEA member states through this powerful underground main line will begin in the fourth quarter. Delivery of up to 8-9 billion cubic meters of gas is planned for next year.

The total length of the line is 2,677 kilometers. At present, construction of 2,100 kilometers is complete. Builders and installers from the GDR, Czechoslovakia, Hungary, Poland and the USSR are striving not only to complete the construction of the 6 planned compressor stations on time, but also to put such compressor stations as Udal'skaya, Antipovka, Bar and Khust into operation ahead of schedule this year. [Text] [Moscow ECONOMICHESKAYA GAZETA in Russian No 9, Feb 78 p.2]

GRYAZEVETS-LENINGRAD PIPELINE--The commissioning of the Gryazevets-Leningrad pipeline this year will be of great importance in assuring a constant gas supply to the northwest area of the country. The length of the line is 626 kilometers, and it consists of 1,020 millimeter pipe. It is designed to transport 10 billion cubic meters of gas a year. The Lengazspetsstroy [Leningrad Special Gas Construction], Sredazneftegazstroy [Central Asian Oil and Gas Construction], Shchekingazstroy [Shchekino Gas Construction] and Mosgazprovodstroy [Moscow Gas Pipeline Construction] trusts have had to overcome many swamps, rivers and lakes during construction. The speed of construction of this gas pipeline is still not fast enough. There is still not enough equipment available along the right-of-way, and the

log roads which are needed to support work in swamp areas are being constructed only slowly. The Ministry of Oil and Gas Construction should immediately complete the organization of process flows for welding, insulation and pipe laying and assure a full complement of construction equipment. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 9, Feb 78 p.2]

NIZHNEVARTOVSK-KUZBASS LINE--Large quantities of gas, a valuable chemical raw material and an efficient fuel, are obtained as a by-product of petroleum extraction at the Samotlor oilfield in Tyumen' oblast. Before utilization this gas must be refined to extract the heavy fractions. For this purpose, three large gas refineries have been built in the Nizhnevartovsk area. In order to deliver the gas to the Kuzbass area, a 940-kilometer gas pipeline between Nizhnevartovsk and Kemerovo has been laid, and gas is being transported to the enterprises through it.

This gas line is now to be lengthened by 194 kilometers to Novokuznetsk, thus making possible the more efficient utilization of Tyumen' casing-head gas resources. Such major enterprises in ferrous metallurgy as the West Siberian plant and the Kuznetsk combine have been converted to gas fuel. The new section of pipeline will consist of pipes 1,202 millimeters in diameter. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 9, Feb 78 p2] 8480

NEW INSTITUTE IN ORENBURG--The Volga-Urals Scientific Research and Planning Institute for Gas has begun its work in Orenburg. The director of the new scientific center, V. Shvets, describes its aims and tasks: "The gas fields recently discovered in the Urals and the Caspian Depression have their own special characteristics. The blue fuel contains as many as 10 hydrogen sulfide components. These have great value for the national economy, but their extraction requires the joint efforts of scientists and specialists in various disciplines. This institute is concerned with developing the all-round utilization of such gas reservoirs." [Text] [Baku VYSHKA in Russian 18 Feb 78 p 3]

GAS MOVES OIL--A new oil pipeline now connects Cape Rakushechnyy with the oil workers' town of Zhetybay. The pipeline is unusual in that the oil will be pumped without the aid of compressor stations, using instead the pressure of casing-head gas. This method is much more convenient and economical. [Text] [Moscow IZVESTIYA in Russian 28 Jan 78 p 3]

POWER LINE ICE PROTECTION--Ice coatings are a real problem for electric power lines. The lines sag under the weight of the ice and reinforced concrete supports can snap like matchsticks in even a light wind. To prevent such occurrences, power line workers have had to knock the ice off with poles, which is dangerous, fatiguing, and--the main thing--not very effective. Specialists at the Kustanayenergo [Kustanay Power Engineering] administration can prevent breakdowns in a matter of minutes. They have developed themselves several devices which use direct current to melt ice off the power lines. This approach was prompted by scientists of the Lvov Polytechnical Institute. Theoretical studies and conceptual schemes were drawn up under the leadership of Doctors of Technical Sciences G. I. Denisenko and G. A. Genrykh. The Kustanay energy workers are currently preparing a display for the Exhibition of Achievements of the National Economy of the USSR which will demonstrate in detail the practical application of the innovation. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 31 Jan 78 p 2]

TRANSFORMER DEVELOPMENT--The Zaporozhtransformator [Zaporozh'ye Transformer] production association is the supplier of power transformers and high-voltage apparatus for various power stations in the country. Testing of the largest single-phase autotransformer in the country is currently under way here. [Text] Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 29 Jan 78 p 1]

MANGYSHLAK OIL EXPLORATION--The Mangyshlak peninsula has been transformed into an oil and gas region in recent years. Every day tens of thousands of tons of "black gold" are shipped to the Center from here. A constant search for pools of natural fuel is under way. The personnel of the Mangyshlak-neftegazrazvedka Integrated Oil and Gas Exploration Expedition are working on an accelerated schedule. The chemical industry, power engineering and the building industry are being developed along with oil and gas extraction in Mangyshlak. [Text] [Moscow PRAVDA in Russian 16 Feb 78 p 2] 8480

YAMALO-NENETS OIL-- Prospectors have an old tradition of marking gas deposits on the geological map with scarlet marks. In recent years, many of them have appeared in the Yamal tundra. "The geological map of our autonomous district is changing rapidly. New deposits are appearing on it," said V. Podshibyakin, head of the Yamalneftegazgeologiya Association and winner of the Lenin Prize. "Now we are exploring the northern extremities of the peninsula, as well as the remote Krasnosel'kupskiy Rayon. Oil wells have marched into absolutely uninhabited places, many thousands of kilometers from Bol'shaya Zemlya." [Text] [Moscow IZVESTIYA in Russian 28 Feb 78 p 3] 8588

NEW POWER BLOCK--Moscow--The seventh energy block unit of the Moscow TETs-23 has produced its first 10 million kilowatt-hours of electrical power. Meters have begun to count off the next million at this 250,000-kilowatt plant. "It was put in operation half a year ahead of schedule," L. Al'bertinskiy, head of the technical production division of the enterprise, said, "just as, incidentally, other large blocks. Now the total power of the TETs has reached 1.15 million kilowatts. It provides the center of the city and five other regions inhabited by millions of people with heat and energy." The immediate task of the collective here is to put all parts of the seventh power block completely in operation by 1 May. Here good labor examples have been set by senior machine operators R. Pil'nenskiy and V. Trubitsyn. The collective of TETs-23 has promised to fulfill the plan for the first 3 years of the Tenth Five-Year Plan by the first anniversary of the adoption of the Constitution of the USSR. Several innovations are being introduced here and should lead to the conservation of 11,000 tons of conventional fuel units this year. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Feb 78 p 1] 8588

NEW GAS TRANSMISSION UNIT--The largest GTN-25 unit in the nation for the transmission of natural gas has been manufactured in Leningrad by the Nevskiy Zavod Association imeni V. I. Lenin. The main 25,000-kilowatt model will be tested at the Novgorod Experimental Station of the Ministry of the Gas Industry. Up to the present time, the association's machine builders have manufactured 10,000-kilowatt turbines for the transmission of natural gas. The dimensions and weight of the new unit are much greater

than those of the "turbine-ten." The association will conserve dozens of tons of heat-resistant steel on each new unit by using progressive designs. [Text] [Riga SOVETSKAYA LATVIYA in Russian 3 Jan 78 p 1] 8588

LENINGRAD GAS FACILITIES--Leningrad--Gas facilities have been installed in the last three regional centers of Leningrad Oblast now that the gas distribution station has begun operating in Lodeynoye Pole. Two-thirds of all the boilers producing heat for more than 355,000 urban and rural homes, as well as animal husbandry complexes and poultry factories, are now operating on "blue" fuel here. The underground pipeline network serves the residential areas of 160 sovkhoses. According to the comprehensive plan for the economic and social development of Leningrad and the oblast, gas facilities are to be installed in all populated points of all 16 rayons by the end of the present five-year plan. [Text] [Riga SOVETSKAYA LATVIYA in Russian 8 Jan 78 p 1] 8588

LATVIAN UNDERGROUND STORAGE--Riga, 10 Feb--The Inchukalinskoye Underground Gas Storage Facility, which provides Riga and other Latvian cities with blue fuel, is to be enlarged considerably. The second compressor shop is being built. Six powerful gas pumps and the equipment of distribution centers will be installed here. Sixteen additional storage wells have been drilled in this location. Motorized compressors will pump the fuel 700 meters down under pressure of up to 100 atmospheres. Here the fuel will be stored in porous limestone until it is needed. [Text] [Moscow PRAVDA in Russian 11 Feb 78 p 6] 8588

METHANE GAS EXPLOSION IN SOKURSKAYA MINE--On 20 February 1978, there was an accident--a methane gas explosion--at the Sokurskaya Mine of the Karagandaugol' Production Association which led to the loss of human lives. The CPSU Central Committee and the USSR Council of Ministers express deep condolences and sympathy to the families and relatives of those who died, to the victim workers and engineering and technical personnel, to the mine collective and to all miners of the Karaganda Coalfield. The Government of the USSR and republic agencies of the Kazakh SSR are taking measures to aid the victims and the families of the dead miners and to eradicate the after-effects of the accident. [Text] [Moscow PRAVDA in Russian 22 Feb 78 p 1] 8588

POWER STATION READY FOR OPERATION--Leningrad--The Leningrad turbine builders from the Metallicheskiy Zavod Association have finished building the main turbine of the Sayano-Shushenskaya GES. The last units of this turbine for the most powerful hydroelectric station in the world have just been sent to the construction site in the Karlovyy Range. Besides this, workers were able to finish building this turbine a year ahead of schedule. This is the result of the widespread socialist competition at the enterprise within the framework of "Contract-28"--a comprehensive cooperative agreement concluded by all of the factories and plants taking part in the construction of the Sayano-Shushenskaya GES. The builders are ready to accept delivery of the last parts of the 640,000-kilowatt block. It will be put in operation this

year, 12 months ahead of the planned date. [Text] [Moscow STROITEL'NAYA GAZETA in Russian 12 Feb 78 p 1] 8588

NEW DRILLING METHOD--Alma-Ata--A thermodetonation drilling assembly has been built at the Kazakh Polytechnical Institute imeni V. I. Lenin. The drilling is done by means of a gas jet created by a microreactive burner. Because of its unique design, the gas emerging from the nozzle is heated to high temperatures. The intermittent thermodetonation wave created by the unit disintegrates the hardest rock easily. Experiments with the aid of building stone have proved that flame drilling is much more effective than machine drilling. This new item will be used extensively in geology, mining and the construction materials industry. [Text] [Baku VYSHKA in Russian 21 Feb 78 p 3] 8588

MINUSKINSK ELECTRICAL ENGINEERING CENTER--Minusinsk--The first capacities of the plant for the manufacture of nonstandard equipment of the Minusinsk Electrical Engineering Complex were started up yesterday, a month ahead of schedule. Now the collective of the Minusinsk Promstroy Trust is concentrating on the construction of a plant for the manufacture of vacuum high-voltage switches and vacuum arc-suppression chambers. These products are intended for the high-tension power mains which will connect the power systems of Siberia and Central Asia with the unified electric power system of the European part of the nation. The new plant is to open for operation next year. The Minusinsk Electrograd Association unites 12 large enterprises which will produce electrical insulation materials, cable, power transformers, electric engines and turboalternators--from miniatures to giants with twice as much power as Dneproges. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 4 Feb 78 p 1] 8588

SPIRAL-SEAM PIPE--Al'met'yevsk--The collective of the Al'met'yevsk Spiral-Seam Pipe Field Base of the USSR Ministry of the Construction of Petroleum and Gas Industry Enterprises produces goods used widely in the construction of gas and petroleum pipelines, petroleum product lines and technological, industrial and other pipelines and in the erection of oil and gas wells and compressor and pumping stations. Spiral-seam pipes, which are "sewn together" by the arc-welding method, are popular with their 2,500 users. When the Al'met'yevsk pipes were being certified for the State Mark of Quality, their seams proved to be quite strong and their design proved to be efficient. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 4 Feb 78 p 2] 8588

OIL PIPELINE UPKEEP--The first industrial consignment of cleaning and insulating units for repairing existing oil pipelines was built by the collective of the Leningrad Machine Building Plant. Today these machines are on their way to the Uralo-Sibirskoye and Krasnodarskoye Oil Field administrations. Cleaning and insulation of the pipe till now was manual in the repairing of the arteries of the liquid fuel. Now operators of the oil routes are getting high-productivity equipment. The machines--their production began in Leningrad--are intended for cleaning and insulating pipe from half a meter to 1.2 meters in diameter. Their productivity is as high as 2 kilometers per working day. On order of the oil industry workers, the units--in contrast to series-built units--are equipped with electric motors rather than diesel motors. This goes far in modernizing operations. [Text] [Leningrad LENINGRADSKAYA PRAVDA in Russian 23 Dec 77 p 2] 10123

200. MILLIONTH TON OF OIL--The 200 millionth ton of "black gold" was extracted since the first of the year in the Tyumenskaya Oblast oil fields. The Siberian oil workers are the first to bring in this much oil. The record was set because the fuel and energy base of Western Siberia is under mastery in a fundamental and massive way. The most advanced gains in science and technology are finding swift adoption here, all the best from modern industry. Tyumen' workers--in the anniversary year--have, simultaneously with exploiting of the new fields, done a great deal to bring in the liquid fuel faster at earlier-mastered fields as well. Water pumping into formations is widely practiced here for this purpose; pressurized, the water greatly speeds the recovery of petroleum from the deposits. By carrying out the decisions of the 25th CPSU Congress, Tyumen' workers targeted the following: to raise the recovery level of "black goal" to 310 million tons in 1980. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 14 Dec 77 p 1] 10123

YAKUTSK GRES--The planning and production of the first stage of the Yakutsk GRES with a capacity of 100,000 kilowatts has been nominated for the USSR Council of Ministers' 1978 prize competition. The station was built by the VilyuyGESstroy [Vilyuysk Hydroelectric Station Construction] administration according to plans drawn up by the Leningrad department of the Teploelektroproyekt institute [All-Union State Institute for the Planning of Electrical Equipment for Heat Engineering Structures]. This gas-turbine GRES is located near Yakutsk in a permafrost area. Its first stage includes 4 units, each with a capacity of 25,000 kilowatts. Natural gas from nearby fields is used as fuel.

In the Far North, gas turbine stations have a number of advantages over steam-powered ones, including their relative simplicity, lighter weight and requirement for equipment and buildings of smaller dimensions. The Yakutsk GRES has attained a high level of automatic control as well as high operating reliability. All units were put into operation in an extremely short time. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 9, Feb 78 p 9]

UNDERGROUND GAS STORAGE--The underground gas storage reservoir in Inchukalns has gained a new lease on life. Work to expand it is under way. A compressor department is being constructed on the storage site; in it will be installed 6 powerful gas pumping units and 2 new distribution points for the blue fuel. The expanded storage reservoir will be able to take in up to 2 billion cubic meters of gas a year, twice as much as at present, following opening of new wells. Some 16 new wells with depths up to 700 meters have been drilled in porous sandstone alongside 23 existing wells. The fuel will be pumped in at a pressure of 100 atmospheres by 3 new motor compressors to supply the Latvian capital. [Text] [Riga SOVETSKAYA LATVIYA in Russian 4 Feb 78 p 3] 8480

AZERBAYDZHAN-GEORGIA GAS PIPELINE--Welding of the first pipe lengths began of a new trunk gas pipeline, to more full delivery the blue fuel to the Transcaucasian republics. The underground route starts a little distance from the city of Kazi-Magomed. Water obstacles, rail lines and highways stand in the path of the builders of the nearly 400-kilometer-long channel of this gas "river." Operations are going on simultaneously at two route sections. When the new gas pipeline goes into service, gas delivery from Azerbaydzhan to Georgia and Armenia will be significantly higher. [Text] [Moscow TRUD in Russian 11 Dec 77 p 1] 10123

MANPOWER

CENSUS PREPARATIONS REVEAL IRREGULARITIES IN ARMENIA

Yerevan KOMMUNIST in Russian 27 Jan 78 p 2

[Article by I. Kazinyan, Armenian SSR deputy minister of internal affairs:
"A Matter of Great Importance"]

[Text] Less than a year remains before the next, sixth all-union population census. This measure is of great state importance. The census permits us to determine not only the numerical composition of the population of the Soviet Union, but also to determine the rate at which it is increasing and to ascertain demographic tendencies in our country.

To ensure that the census is conducted with high standards, skilled census takers are being enlisted and trained. Their work can be compared without any exaggeration to a science--they will work on the basis of a specially devised methodology, thanks to which, during the census the most diverse information will be gathered about each person, characterizing age, sex, profession, education and place of residence. They will obtain data about the dynamics and level of the birthrate, about family structure, and about factors influencing the growth of the population.

Many state institutions and organizations are participating in the preparations for conducting the census. Heavy responsibilities also are placed on the militia. The Ministry of Internal Affairs of the republic jointly with state institutions for statistics is already conducting specific work in preparation for this important step. The peculiarity of the forthcoming census lies in the fact that, unlike previous ones, it will be conducted at the peak of the passport reform, which will be completed in 1981. Undoubtedly, preparation for the all-union census will exert an influence on the course and quality of the passport reform. Incidentally, at the present time, more than 30 percent of the citizens of our republic have a new-type passport.

In turn, the passport reform measures will significantly facilitate the carrying out of the population census on a high level. It is obvious, that the census' quality will be determined by the degree of conformity between the census figures and the current statistical record. Therefore, it is very important that the census correspond as fully as possible to data on the actual movement of the population.

In conformity with the calendar plan worked out by the Central Statistical Administration attached to the Council of Ministers of the Armenian SSR, the internal affairs organs of the republic--in cooperation with state institutions for statistics and the municipal service-housing organizations at Gorispolkams and Rayonispolkoms--are conducting a joint, complex check of the population record. Our workers and activists determine the status of the record of actual residence of the population, and eliminate the shortcomings revealed.

The activity of the divisional inspectors of the militia has been noticeably stepped up. Special attention is now being given to their work of ensuring the completeness of the population record and the timeliness of registration of an accounting for citizens. This work has been especially well conducted in the Artashatskiy, Gugarskiy, Stepenavanskiy, Araratskiy, Azizbekovski and some other rayons.

The government of the republic has required Gorispolkoms and Rayonispolkoms and the internal affairs organs to take specific steps for registration of citizens living and working in cities and rayon centers without being registered. This question has been discussed in all Rayonispolkoms and Gorispolkoms, and measures have been elaborated and are being implemented for insuring that a full record is made of the population.

This, of course, doesn't mean that violations of the passport regime have been eliminated in the republic. Such cases are still encountered. In spite of the steps taken, checks reveal many citizens living without passports and leaving without official release. Many children are not entered in the house registers. These on the whole, are the violations of the passport system, which adversely affect the record of the migration of the population.

The shortcomings in the work on ensuring completeness of the population record noted in Leninakan and Yerevan, unfortunately, are being eliminated slowly. In these cities, some of the citizens for a number of reasons live there without being registered. This phenomenon is especially characteristic of Spandaryanskiy "imeni 26 commissars," and Ordzhonikidzevskiy Rayons. Some citizens have been living there for a long time without being registered and actually are not accounted for anywhere. This is a serious violation of the passport system against which to this day, it must be admitted, the struggle is being waged only listlessly and without the necessary energy. It is indisputable that, on the threshold of the all-union census, it is necessary to put all these questions into order.

Checks show, that violations began and continue to take place mainly because of actions of the leaders of individual institutions, enterprises and organizations who hire unregistered persons, disregarding the requirements of the Statute on the passport system in the USSR. Thus they create conditions for the illegal movement of citizens to big cities from other places. And these people remain unaccounted for a long time.

The Ministry of Internal Affairs of the Armenian SSR in cooperation with the statistical organs and other organizations is expanding the scale of preparatory work, displaying concern for high-quality recording of the population on a current basis, which will undoubtedly affect the successful conducting of the all-union census.

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ALL-UNION CONGRESS OF TEACHERS TO BE HELD

Moscow UCHITEL'SKAYA GAZETA in Russian 18 Feb 78 p 1

[Unattributed article: "On Conducting the All-Union Congress of Teachers"]

[Text] The USSR Council of Ministers has accepted the proposal of the USSR Ministry of Education and the Central Committee of the Trade Union of Workers of Education, Higher Schools and Scientific Institutions on conducting an All-Union Congress of Teachers in the city of Moscow in the Kremlin Palace of Congresses on 28-30 June. Up to 4,000 delegates will be present.

The colleagues of the USSR Ministry of Education and the presidium of the Central Committee of the Trade Union of Workers of Education, Higher Schools, and Scientific Institutions have approved measures on the preparation for the congress.

Tasks of the organs of public education and schools for fulfilling the decision of the 25th Party Congress and the decree of the CC CPSU and USSR Council of Ministers, "On the further improvement of the education and training of students of general-education schools and the preparation of students for labor" will be examined at the congress.

The ministries of education (general-education) of the union republics, oblast and kray divisions of public education and the republic, oblast and kray committees of the Trade Union of Workers of Education, Higher Schools, and Scientific Institutions have been entrusted with the necessary measures for the preparation for the congress; using this preparation for the further raising of the quality and efficiency of all activities of the school and other establishments in the educational system.

Norms have been established for representation at the All-Union Congress of teachers--one delegate for every 1,000 teachers, educators and administrators of all types of schools and other secondary educational institutions; workers of the organs of public education, pedagogical institutes, and scientific, methodological, preschool and extra-scholastic institutions. Elections of the delegates to the All-Union Congress of Teachers will be conducted at republic, oblast and kray (or city for Moscow and Leningrad) congresses (conferences) of teachers.

CALL FOR MORE SECONDARY VOCATIONAL-TECHNICAL SCHOOLS

Moscow SOTSIALISTICHESKIY TRUD in Russian No 1, 78 pp 30-39

[Article by Sverdlovskiy Obkom Secretary L. Ponomarev: "School-Labor Training-High Production Efficiency"]

[Text] Increased Education--Demand of the Times

Scientific-technical progress is leading to the profoundest changes in man's life and activity--the nature of his labor and his role in the production process. It is making new demands on the amount and depth of erudition and increasing the social activeness of the working people and developing a creative, innovative attitude toward work and scientific-technical quest. Comrade L. I. Brezhnev said at the USSR Supreme Soviet Seventh Session: "We are all well aware of the enormous significance of a creative attitude toward labor and mass technical creativity both for the development of the country's economy and for people's communist upbringing."

The 25th CPSU Congress emphasized the need for a comprehensive approach to communist training providing for the close unity of the ideological-political, moral, and labor training of the youth, to which enormous attention should be devoted by the party, soviet, trade union, and Komsomol organizations and each member of our socialist society.

The entire system of education and, primarily, the general educational and vocational-technical school are called upon to lay the foundation of a communist attitude toward labor and to inculcate the requirement for each to labor conscientiously. This task becomes particularly topical under the conditions of universal secondary education, which is guaranteed by the new USSR Constitution. "Questions of labor training and of the correct choice of one's place in life are connected with the solution of a large circle of tasks," Comrade L. I. Brezhnev, general secretary of the CPSU Central Committee, has said. "And an exceptionally great deal is being done in this respect in our country. I have in mind both state measures, particularly the role of our school, and the colossal amount of work which our Soviet community is performing in this question."

With consideration of present-day tasks and the prospects for the development of the oblast's national economy the Sverdlovskiy Obkom, in conjunction with the institutes of the USSR Academy of Sciences Ural Scientific Center, has formulated the main directions of the development of higher, secondary specialized, vocational-technical, and school education in the oblast for the 10th Five-Year Plan and for the long term up to 1990. In the compilation of the long-term plan specific paths were charted for an improvement in the system of the training of upper- and middle-tier specialists and also of the training of skilled workers with secondary education and for an improvement in the work of the general educational school in accordance with the decisions of the 25th CPSU Congress. We have concentrated special attention on the accelerated development of the secondary vocational-technical schools as the main link in the system of vocational-technical education. This line corresponds to the CPSU Central Committee and USSR Council of Ministers decree "Further Improvement of the Process of the Instruction and Training of Students of the Vocational-Technical Education System."

A rapid rise in the educational level of Soviet workers is a characteristic feature of the current stage of the scientific-technical revolution. Thus whereas in 1959 some 396 workers out of every 1,000 had higher and secondary education, the figure in 1977 was 732. The proportion of graduates of the 10th grade taken on at enterprises in 1962 was 23.2 percent, while it was almost 80 percent in 1976. This is a gratifying fact, but it should be understood here that it is highly necessary for young people to not only have some idea of the professions but also perfectly defined practical skills and basic vocational training for this type of labor or the other. This is all the more important in that actual reality makes considerable amendments to the school graduates' plans for life, and it is incumbent upon us to help them prepare for labor in the material production sphere. In 1976 more than 2,000 young men and women in our oblast failed competitive examinations for VUZ's and tekhnikums, and many of them felt this keenly, evaluating it as a failure in life, and failed to participate in social production for 4-5 months. But this would not have been the case if they had known that modern production needs people with complete secondary education and they had been prepared in advance for work in their chosen trade.

The obkom attentively studied the situation that had come about and adopted the corresponding decree "Status of and Measures To Improve Work on the Vocational Guidance of General Educational School Students and on Training Them for Work in Production," which formulated the party, soviet, and economic organizations' practical tasks for an extended period. The obkom constantly monitors their fulfillment and actively assists in their solution. The obkom bureau has also discussed, for example, such questions as "The Joint Work of the Party Organizations and Collectives of the General Educational Schools of the Pyshminskiy Rayon's Sovkhozes and Kolkhozes on the Instruction and Communist Upbringing of the Students," "The Organization in the Oblast's Cities and Rayons of Interschool Industrial-Training Centers for the Labor Instruction and Vocational Guidance of the Students of the Secondary Schools' Senior Classes," and "The Initiative of the

Kamenskiy Rayon's General Educational School Graduates, Who Expressed a Desire To Work in Agricultural Production." The decrees and the measures adopted for their fulfillment have contributed to the strengthening of the material base of labor instruction, while the problems of training the youth for work in production have come to be solved more purposefully, with consideration of the requirements of the national economy and the adolescents' personal proclivities and capabilities.

Working in Accordance With the Plan, in a Single Direction

Displaying constant concern for the problems of school students' labor training and analyzing the practice that has evolved, we have seen that the best results are achieved where the comprehensive system of the "school-vocational-technical school-labor collective" link operates efficiently. Frequently the enterprises' patronage assistance to the student collectives creates merely an impression of everything being alright insofar as no emphasis is put on attention to a comprehensive approach to the shaping of the personality of the school student and his training for work. Production workers' episodic meetings with teachers and students, the enterprise's one-time-only material assistance to the school, the frequently formal contacts of the public organizations of the two collectives, and so forth are not having the necessary educational impact. We believe that it is now necessary to extend and develop patronage work and strengthen the collaboration of the school and labor collective.

Undoubtedly, the party committees should play a leading role. They are called upon to insure that the plans of the socioeconomic development of the city, rayon, enterprise, and kolkhoz and sovkhoz provide for the joint training activity of the academic institution and production. The party organizations have been successful in interesting the managers of industrial enterprises and kolkhozes and sovkhozes in work with the school students for, the organization of matters being such, the bulk of them will, upon completion of secondary education, join the production collectives or will be sent for training in technical schools of vocational-technical education.

The systemic and purposeful leadership of the party organizations has enabled us to achieve positive results and, primarily, to create the material base for the labor training and vocational guidance of the senior school students. The opportunity has arisen for concentrating monetary resources and putting them on a cooperative basis and for the plan-oriented provision of the academic institutions with materials and equipment, without which a serious improvement in labor training is impossible. Some 27 interschool industrial-training centers, one in a rural locality, five training shops, 22 industrial-training sectors and workshops at the enterprises and in the schools, and 21 urban vocational guidance offices are currently functioning in the oblast. Some 4,200 study rooms were fitted out in the schools by the enterprises in the Ninth Five-Year Plan. The Obkom has set the following task: organizing industrial-training centers in each city in the next 2 years.

The party committees and managers of the Verkh-Isetskiy Metallurgical Plant imeni V. I. Lenin, the Nizhnetagil'skiy Metallurgical Combine imeni V. I. Lenin, the Severskiy and Sinarskiy pipe plants, the Ural'skiy Car-Building Plant imeni F. E. Dzerzhinskiy, the Sverdlovsk Industrial Rubber Goods Plant, and the Uralmashzavod are approaching this with great concern and state-minded understanding. These collectives have not only created modern physical plant for the labor instruction of the school students but have also enlisted skilled personnel from production. Thus an industrial-training center where all the senior school students of Sverdlovsk's Verkh-Isetskiy Rayon receive instruction has been fitted out mainly by the Verkh-Isetskiy Metallurgical Plant; the Sinarskiy Pipe Plant is the principal patron of the Sinarskiy Industrial-Training Center; and the Severskiy Pipe Plant has created a sound base and selected experienced regular teachers for the labor training and production instruction of the senior school students.

The interschool industrial-training centers are an important form of the students' labor instruction and vocational guidance; 25,000 students of the senior classes are receiving instruction in them in special trades corresponding to the nature of production of the cities and rayons. Thus in the Leninskiy Rayon's Industrial-Training Center approximately 2,500 school students are not only learning how to work but also participating directly in production work. They are given the opportunity of choosing one of 11 production-instruction specialities. Fifteen of the rayon's industrial enterprises quickly reequipped an 8-year-school building and expanded it by 3,000 square meters and have themselves already created 25 laboratories, production sectors, and classes for theoretical studies in metal working, automotive knowledge, radioelectronics and communications, trade and public catering, mechanical drawing, typing and stenography, electrical engineering, sewing, applied art, and programming. The entire work is organized on the basis of an annual academic plan. The study schedule is compiled such that each senior student studies in the center only once a week.

The center has become the focus of all vocational guidance work in the rayon. Tutors, extracurricular and out-of-school work organizers, school directors, and teachers of labor, physics, drawing, mathematics, and so forth teach here. It is mainly people who have come from production and sound specialists in their work who teach here. Of the 32 teachers, 25 have higher education and seven have secondary specialized education.

Competition has been organized among the study groups. On the year's results the winners are awarded testimonials and mementoes, they receive tourist passes for trips to historical sites of the oblast and the country, and their names are entered on the Roll of Honor. The wall newspaper ORIYENTIR, which reflects the life of the training center, comes out twice a month, and there is a weekly radio newspaper.

Instruction in the training center is, if we may call it such, prevocational; it is essentially a continuation of polytechnical instruction, but more purposeful. It is by no means a question of acquiring a special trade but of gaining a minimum of professional knowledge and basic labor skills in order that the young men and women may, when embarking on labor life, find their bearings better and feel more confident. Statistics do not always reflect complex social phenomena, but I would like to give certain figures pointing to the end results of the training center's activity. Thus 72 percent of the students studying electrical engineering in the center have found a job or are continuing study in academic institutions in the same special field; the figure for metal working is 76 percent; and the figure for radioelectronics is 64 percent. The situation is roughly the same in the Kirovskiy, Verkh-Issetskiy, and Ordzhonikidzevskiy training centers of Sverdlovsk and the Asbestovskiy, Polevskiy, Kirovogradskiy, and other training centers.

While receiving vocational guidance and acquiring basic production skills the students at the same time become mentally attuned to productive, socially useful labor and are raised on the revolutionary, combat, and labor traditions of the working class and in a spirit of devotion to its ideals. An unsuccessful attempt to enter the VUZ or tekhnikum is not a tragedy in the graduates' life; they immediately go to work at base enterprises or study in technical schools.

Experience convinces us of the expediency of holding eighth-grade students' labor classes not in the school workshops but precisely in the training centers, where there is a more modern study base and conditions conducive to vocational guidance. We have organized labor classes in certain industrial-training centers with a sound material base as an experiment.

The schools' active use of the industrial-training centers' base makes it possible to raise the level of all extracurricular work on the development of the students' technical creativity. The atmosphere approximating that of production which has been created in the training centers and the spirit of competition are being favorably reflected in the students' conduct. There is practically no unexcused absence from the classes, nor are there flagrant violations of labor discipline here. We are currently trying to perfect the teaching and educational processes and to conduct the training not only in accordance with the enterprises', construction projects', and services sphere's personnel requirements but also with the training of workers in the technical schools in order to facilitate the transfer of industrial-training center graduates to these schools and instruct them in accordance with an abbreviated program.

Undoubtedly, everything progressive is most actively supported by our party organizations in the localities. The Kamenskiy Raykom's activity is indicative in this respect. The rayon is situated in direct proximity to Kamensk-Ural'skiy--a major industrial center with a high density of academic institutions and industrial and construction enterprises. As a result, a

considerable proportion of the youth has quit the village and found work in the city or has come to study. The youth's outflow from the village to the city, which has increased in recent years, set the raykom the task of studying this phenomenon in earnest and adopting effective measures to retain skilled personnel in the countryside.

An analysis of the state of affairs prompted the sole correct solution: start by inculcating in the school students a love for their birthplace and for agricultural labor. This is not a new truth, but to underestimate it means having the most negative effect on work with the youth. All the rayon's farms themselves decided to set up their own rural industrial-training center in the premises of the "Kamenskiy" Sovkhoz's 8-year school. The choice of this very farm was not fortuitous. The level of mechanization of labor is high there, progressive techniques are employed, and it is the foremost farm in the rayon.

Proceeding from the sovkhoses' skilled-personnel requirements, five types of production instruction were determined: those of driver, tractor operator, machine milking expert, vegetable grower, and trade worker. Enterprises were determined for each special trade which were entrusted with the duties of fitting out and designing study rooms and laboratories and the selection of teachers from among the skilled specialists. A council was set up for day-to-day leadership of the activity of the base enterprises and supervision and coordination. Some 600 students of the 9th-10th grades of the rural secondary schools are receiving instruction in the training center. The students are taken to the center in buses from the passenger automotive enterprise on special schedule. Before classes begin, joint parent and student meetings in which members of the raykom bureau and the rayispolkom participate are held in all the schools.

A section for production practice is reserved for the training center in the rayon "Sel'khoztekhnika" Association, as are a dairy farmstead for 200 head of cattle and several hothouses. The training center has wheeled tractors and crawlers, two GAZ-53 automobiles, a bus, and harvesting equipment. In the specialty of trade worker the students perform their practical work in the stores of the rayon consumers' cooperative society. The ninth-graders do their summer work on the sovkhoses according to their place of residence in accordance with the training center's program and under the supervision of its teachers. Upon completion of the course of instruction, the students sit examinations of the State Automobile Inspectorate, the State Technical Supervision Inspectorate, and the Agricultural Administration commissions and receive the corresponding certificates. The training center's graduates are granted privileges upon entry into the rural vocational-technical school in the rayon, and their course of instruction is reduced to 4-6 months.

The efficiency of this form of labor training and vocational guidance is obvious: whereas in the Ninth Five-Year Plan 20 percent of the graduates of the rayon's secondary schools chose a trade connected with agriculture,

in 1976 their number had increased to 42 percent, that is, had more than doubled. At the same time the number of school graduates who entered agricultural tekhnikums and VUZ's tripled. In 1977 more than 60 percent of the students linked their life with agriculture.

It is very important that the young people who have opted for an agricultural trade be firmly retained in the countryside. As a rule, the training center and vocational-technical school graduates are given new equipment, an experienced mentor is appointed for them, and real prospects are determined for continuation of their education and for their obtaining housing. The ceremonial initiation of young people as workers is a widespread practice in the rayon, a youth competition has been specially organized, and there are competitive reviews of the young machine operators and milkmaids.

We realize that there are still many unsolved questions, even in the rayons which have positive results, including the Kamenskiy Rayon, in the work on labor instruction and vocational guidance. But merely the fact that the raykom has attempted to approach the solution of this problem in a comprehensive manner and has enlisted the relevant organs and convinced them that the training of young workers is their vital concern makes us confident of success.

Comprehensive Development Is the Goal

The problem of preparing school students for labor is not confined to the creation of interschool industrial-training centers. The main thing is still the polytechnicalization of the instruction of the students. We are paying particular attention here to the in-depth and firm assimilation of the fundamentals of the sciences and an entire complex of academic subjects, and not merely individual subjects related to the polytechnical lecture course.

In June 1977 the obkom bureau adopted the decree "Further Improvement of the Work of the Oblast's General Educational Schools To Enhance the Quality of the Instruction and Communist Upbringing of the Students in the Light of the Decisions of the 25th CPSU Congress," which formulated the main tasks to be solved by the party organizations, the teaching collectives, the public education organs, and the labor collectives in the next few years and in the long term.

In our opinion, there should be particular emphasis of the significance of the schools' links with the worker collectives and the life of the city and rayon as a whole. This will help the school students to understand and value the labor of the working class and peasantry and inculcate in them responsibility for preparation for independent life and the acquisition of strong erudition.

The obkom and the party organizations point the schools and enterprises in the direction of the utmost development of children's scientific-technical

creativity, regarding it as a condition of the consolidation of knowledge. The amateur activity of the students which is connected with science and technology and scientific-technical progress and their classes in study groups not only develop technical creativity but also represent sound preparation for mastering a special trade. But as yet only 12 percent of the students are engaged in production-efficiency work, technical modeling, and designing in the oblast.

We have studied favorite pastimes. How many students engage in sawing up, burning up, and cutting out and how many collect stones and polish them! These are traditional popular occupations; they develop the human personality and cultivate a love for work. But we have no organizers or leaders of the students' technical creativity; we should ponder this.

In a number of socialist countries where extensive use is made of our experience the adolescents' technical creativity is very developed, and up to 70 percent of students participates in it. And this is justified since the training of the future creatively-minded engineer, worker, and technician should begin as early as possible. We have enlisted plant production-efficiency experts, inventors, higher school and scientific research institute workers, and agricultural specialists for this reason. Our oblast party organization has supported the initiative of the Komsomol obkom, which is sending 26,000 young workers--production pacesetters and innovators--to work in the schools.

The student production brigades and forestry sections are a good school of the inculcation of a communist attitude toward labor under the conditions of a rural locality. The oblast has 144 such brigades and 120 school forestry sections, which unite 31,000 students, for whom 56,000 hectares of arable land and forest have been reserved. The number of labor associations increases with every succeeding year, but it is more than just a question of number. The main thing is the extent to which they correspond to the purpose of their creation, and this is a dual purpose. Both assistance to production and also training. It is important to organize their labor such that professional efficiency, responsibility for the entrusted job, and the habits of social activity be developed in the students.

Unfortunately, it has to be mentioned that certain sovkhos and kolkhos managers regard the brigades as auxiliary manpower and bring them to mind only in the periods of mass agricultural operations and when there is a shortage of work hands. We resolutely oppose such managers and aspire on the basis of positive experience to show them that they are profoundly mistaken. For the folk wisdom "What you sow, so shall you reap" holds good in this situation also: today's student is tomorrow's agricultural worker. This is all the more important in that the problem of retaining the young people in the countryside is for our industrial oblast a very acute one, and the fulfillment of the tasks set by the party with respect to the development of agriculture in the 10th Five-Year Plan and subsequent years is closely connected with its successful solution.

The experience of many years' standing of collaboration between the collectives of the local secondary school and the "Borodulinskiy" Sovkhoz of Sysertskiy Rayon, which is headed by Hero of Socialist Labor P. Zuyev, may serve as an example. This is one of the farms of the oblast where the problem of holding on to the skilled personnel has to a large extent been solved: after completing school or following study in agricultural vocational-technical schools, tekhnikums, and VUZ's and after Soviet Army service, 80 percent of the graduates returns to the sovkhoz. The long-term plan of the farm's socioeconomic development is helping the sovkhoz's party organization and leaders to see the immediate tasks in this sphere as they really are and determine the prospects correctly.

The senior pupils work and relaxation camps have an important role to play in accustoming the students to productive work. This is a successful form of the combination of the socially useful labor and the strengthening of the health of the younger generation prompted by life itself. In the summer period we have up to 70 percent of the school students in work and relaxation camps and other labor associations. The educative effect of such camps is the stronger, the better the work is organized and the better the conditions for relaxation, and for this what are needed are permanent camps with a complete complex of cultural-everyday premises and sports installations. Definite experience has been accumulated in Kamensk-Ural'skiy, where with help of the base enterprises, favorable conditions have been created for organization of the relaxation of all senior-class students in combination with highly productive labor in agriculture.

Much Depends on the Family and Family Traditions

The family exerts great influence on the formation of the adolescents' lofty moral attributes and on the inculcation in them of a love for work. The vast majority of families is doing its parental duty and assisting the school in teaching and educational work. Our oblast has many schools where the teachers and the parents represent a single pedagogical collective, and the fundamental tasks of educating the students are resolved jointly in secondary school No 1 of Verkhnyaya Saida, No 5 of Sverdlovsk, No 15 of Asbest, and many others.

Aspects of family relations should be the subject of profound attention and study by the party and public organizations and the schools' teaching collectives. Universities of pedagogical knowledge for parents have been set up under the leadership of the gorkom in Nizhniy Tagil, and groups of parents and representatives of the enterprises' public organizations which take under their wing families which are not well provided for have been created in Pervoural'sk and Asbest. There are regular conferences for parents in Sverdlovsk at which pedagogical knowledge is propagandized and where it is possible to obtain advice and expert opinion on vocational guidance and other questions.

The oblast's enterprises have many worker dynasties--more than 30,000. These are families sacredly maintaining their loyalty to their own plant or beloved trade, and the members of these families pass on the best traditions of the working class from generation to generation and contribute to the cohesion of the collectives and the training of its members, not to mention such families' enormous influence on the adolescents. The party and trade union organizations study the processes of the formation of labor dynasties and their influence on production matters and the cohesion of the collectives. In conjunction with the oblast council of trade unions, the obkom held an oblast scientific-practical conference "Labor Dynasties--Vectors of the Progressive Traditions of the Working Class," whose aim was to summarize and disseminate the production and social experience of the members of the labor dynasties.

Research conducted at 15 of the oblast's enterprises showed that family collectives promote correct moral upbringing and that the parents' attitude toward labor is an example for the children to follow. It is interesting to note that with the increase in the number of generations there is also an increase in the number of adolescents aspiring to take the path of their parents. In workers' families of three generations 71 percent of those polled expressed themselves in favor of a continuation of family traditions, and this figure was 85.3 percent in dynasties of four generations. These figures point to the great authority of the representatives of the older generations and to their influence on the youth.

On the Path Toward Reorganization

The main source of the provision of production and the services sphere with personnel are the vocational-technical schools, which have now been set qualitatively new tasks. Our party constantly devotes enormous attention to development of the system of vocational-technical education. It has been intensified particularly at the present time, to which the CPSU Central Committee and USSR Council of Ministers decree "Further Improvement of the Process of the Instruction and Training of Students of the Vocational-Technical Education System" testifies. The decree is of particular significance for us since Sverdlovskaya Oblast has a ramified network of such academic institutions. Some 130 vocational-technical schools, where 72,000 students receive instruction annually, are involved in the training of young workers. Approximately 230,000 young men and women received their passes to the working class in the vocational-technical education system in the Ninth Five-Year Plan.

The obkom maintains constant supervision of the development of the vocational-technical school and demands the same of all party organizations in the localities. The obkom bureau regularly examines questions of an improvement in the activity of the vocational-technical schools and summarizes their work experience. New complexes were built, 28 vocational-technical schools for 19,500 students were expanded and modernized, the schools were given equipment worth R6.4 million, and 36 vocational-technical schools

were converted into secondary schools in the Ninth Five-Year Plan alone. The academic institutions of vocational-technical education have been reinforced with qualified teachers, and more than 80 percent of the teachers of general educational disciplines has higher education.

In May 1978 the obkom bureau examined the question "Expansion of the Network and Improvement of the Work of the Oblast's Secondary and Technical Schools of Vocational-Technical Education in the 10th Five-Year Plan in Light of the Decisions of the 25th CPSU Congress." We set unswerving course toward the conversion of conventional schools into secondary and technical schools, taking as a basis the experience of this work available in the country, primarily the experience of the Leningradskaya Oblast party organization.

Of course, many difficulties arise in the training of the system of the vocational-technical schools of skilled workers with secondary education, and there will be no less of them in the future. For it is a question of a new and very complex matter. But this will afford us the opportunity of markedly raising the cultural, professional, and general educational level of the contemporary worker capable of solving the tasks advanced by the scientific-technical revolution.

Even now we can speak of certain positive results. Whereas in 1970 some 500 people completed secondary vocational-technical schools, this figure was 7,500 in 1977, that is, 15 times more. In the current academic year they have accepted 10,300 persons, and this means 19,000 students when the technical schools are included, which constitutes 50 percent of the total intake of the main batch. Currently one out of every four vocational-technical school graduates acquires a secondary education.

The staffing of the vocational-technical schools and the quality of instruction in them largely depend on the efficient interaction of the "school-vocational-technical school-enterprise" system. The experience of the Sverdlovsk Machine-Building Plant imeni Kalinin is clear confirmation of this. A stable system of the replenishment of the labor collective has been worked out here: school under patronage-base technical school-plant. The people who have taken this path are the enterprise's best workers, and there is a virtual absence of turnover among them. There is also considerable importance in the fact that all the students in the school are children of workers of the plant. Sociological studies have shown that young workers whose parents and friends are working at the plant when they joined it are dismissed only one-third as often as those who previously had no connection with the plant.

The young workers' familiarization with the plant begins in the museum, where material on the Kalininites' revolutionary, combat, and labor paths is concentrated and where the manufactured equipment is demonstrated. This symbolizes, as it were, the continuity of the generations. Patronage of the young people is immediately assumed by the regular mentor-workers,

who not only teach the young people expertise but inculcate a sense of high responsibility and pride in the worker's trade and in his plant. From his first days the young worker is obliged to decide the form of enhancing his general educational and professional level which he prefers. Extensive use is made of the new socialist traditions and rituals: initiation as a worker, the ceremonial presentation of the worker's ID card, handover of the first pay packet, and so forth. All this creates an atmosphere in which the young person feels himself to be an equal member of the collective and aspires not to besmirch its honor and to nurture in himself the traits of an advanced worker.

We are disturbed by the fact that in this important work the school is still not ready to render the vocational-technical education system due support, particularly in counseling the school students into continuing their education in the secondary vocational-technical schools. As before, there is a tendency to get rid of weak and average students, transferring them to the vocational-technical education system. Yet vocational-technical education is in greater need than ever of an influx of educated, disciplined, and industrious young people. The leaders of the vocational-technical schools have not yet reorganized their work such as to enhance the authority of their academic institutions. Certain schools in the oblast are housed in unadapted buildings lacking public-everyday premises, dining halls, dormitory facilities, and sports halls. These schools' prestige is low, and their admittance plans are not fulfilled from year to year. The USSR Ministry of Timber and Wood Processing Industry, the RSFSR Ministry of Consumer Services, the USSR Ministry of Chemical and Petroleum Machine Building, and a number of others are, in our view, displaying feeble concern to reinforce the base for the training of skilled workers. The inertia of a number of ministries and departments is frequently counterposed to our desire to accelerate the transition of the vocational-technical schools to the category of secondary academic institutions of vocational-technical education. All this means, meanwhile, unsolved important problems of the training of skilled workers.

The problem of providing the vocational-technical schools with skilled teachers and production-instruction experts is very acute. Whereas in the past the vocational-technical school system was satisfied with draftsmen from the enterprises who had only great experience of life and work, what are needed now are teachers and craftsmen who have an engineering education. The CPSU Central Committee and USSR Council of Ministers decree "Further Improvement of the Process of the Instruction and Training of Students of the Vocational-Technical Education System" provides for the creation of VUZ's for the training of specialists for vocational-technical education. We consider it advisable to organize such a VUZ in Sverdlovsk on the base of the industrial-pedagogical tekhnikum.

Improving the labor instruction, training, vocational guidance, and preparation of young people for life with all the means at their disposal

is one of the oblast party organization's main tasks. This was mentioned with the utmost clarity by Comrade L. I. Brezhnev, general secretary of the CPSU Central Committee, at the 17th Komsomol Congress: "This is a big state issue. All have an interest in its correct organization and solution: the labor collectives, public organizations, the school, and the family. It affects the fate of millions of people, more--our country's future."

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MATERIAL INCENTIVES PROVIDED FOR STUDENTS

Moscow VOSPITANIYE SHKOL'NIKOV in Russian No 1, 1978 pp 30-36

[Article by G. Shevchenko, docent of the department of pedagogy and psychology of the Voroshilovgrad Pedagogical Institute, candidate of pedagogical sciences: "On Material Incentives in Educating School Children"]

[Text] When speaking about pedagogical incentives, one usually has in mind mainly moral, emotional and intellectual stimuli. They undoubtedly play a great role in the formation of the world view and morality of the school children, their cognitive activity and their emotional sphere. Yet one cannot forget about the fact that educational effectiveness in influencing moral factors and all ideological factors in general is achieved only in unity with material factors.

Sometimes the definition of "material incentives" is understood very narrowly, being applied only to forms of encouragement for the labor activity of school children. But in reality, if one proceeds from the philosophical meaning of the concept "material," that is, existing in objective reality and reflected by the consciousness of people, all material factors can fulfill the role of stimuli for education and, with incorrect utilization, can become an impediment on the path to the goal which the pedagogue has set for himself in working with children. A. S. Makarenko wrote: "Everything educates: people, things, phenomena . . . with the evermore complicated world of surrounding activity, the child enters into an infinite number of relations."*

Our state has created all necessary conditions for educating the rising generation. Mandatory universal secondary education free of charge, the

* Makarenko, A. S., "Sochineniya" [Works], Vol IV, Moscow, Izd-vo APN RSFSR, p 20.

issuance of textbooks free of charge, food for children in rural boarding schools free of charge, free transportation of students to school and free use of libraries, houses and palaces of pioneers, clubs, parks, stadiums and swimming pools--all these comprise an immense material incentive which undoubtedly acts for the benefit of education.

But it is also exceptionally important for the life of the child not to be limited only to the sphere of consumption. He must also participate actively in the creation of material values.

"We have accomplished a good deal in improving the material well-being of the Soviet people," said Comrade L. I. Brezhnev at the 25th CPSU Congress. "We shall continue in the future to consistently carry out this tasks. It is necessary, however, for the increased material possibilities to be constantly accompanied by a rise in the ideological-moral and cultural level of the people. Otherwise we can relapse into a Philistine, petty bourgeoisie psychology. We must not fail to take this into account."*

Direct enlistment of adolescents and senior classmen in socially useful productive labor plays an immense role in their education. It is precisely labor that is the "main stimulus" (F. Engels) to the establishment and development of the human personality. Labor also brings about a multitude of other material stimuli which essentially influence the process of education. Let us consider them in the following sequence: first, stimuli related to the participation of school children in material production; then stimuli related to their participation in the distribution of material goods; and, finally, stimuli related to certain areas of consumption that are most typical for the life of the school.

One of the forms of enlisting school children in material production is that of labor associations of city and rural schools which has become widespread in recent years. During the past school year 9 million senior classmen participated in labor associations and they performed more than 300 million rubles' worth of work. There are more and more business executives who are proponents of enlisting school children in serious productive labor: chairmen of kolkhozes and directors of sovkhoses, plants and enterprises in the sphere of services. But pedagogues sometimes express the opinion that the labor of school children who are involved in the training and educational process should not be evaluated from the economic point of view. But here are figures that came from the podium of the All-Union Meeting of Labor Associations of School Children that was held in August 1977 in Moscow: students of schools in the RSFSR,

* "Materialy XXV s'yezda KPSS" [Materials of the 25th CPSU Congress], Moscow, Politizdat, p 78.

during last summer alone, performed various jobs valued at more than 33 million rubles; school children of the Moscow area, working at enterprises of light industry and the textile industry, annually produce products worth more than 3 million rubles; more than 95,000 senior classmen of Leningrad and Leningrad Oblast produced 4.4 million rubles' worth of work last summer. Thus on the scale of the entire country, the "school billion" is certainly not a fantasy. While in the near future, as a result of the productive labor of adolescents and senior classmen, each school will obtain an income of 10,000-15,000 rubles a year, the overall sum will amount to approximately a billion. It would be simply incorrect to say that this is not economically significant. By participating in the work of labor associations school children become familiar with various occupations, which significantly affects their choice of a life task.

In the city the problem of enlisting school children in socially useful productive labor is proceeding at the same rates as in rural areas. And this is understandable. The creation of training shops and sections at enterprises and the construction of inter-school training-production combines and school shops require a considerable amount of time and fairly large expenditures. Yet even today one cannot prepare school children for labor without allowing them to test their own strength, to experience the actuality of their contribution to the nationwide cause.

Let us give some examples from the work practice of individual schools.

The experience of the school in Tikhvin in Leningrad Oblast is interesting. It created detachments for improvement of city outdoor areas; brigades of school children, who have resolved to test their strength in the sphere of services, are working in stores; fifth- and sixth-graders are working in libraries. Senior classmen go to the kolkhozes and sovkhoses for the summer or work in the post office or in the rayon hospital.

A student production brigade was created on the basis of ordinary school shops and has been operating for 8 years in secondary school No 6 of the city of Taganrog in Rostovskaya Oblast. Each school shop received orders: the fitting-mechanics shop--from railroad shops, the wood shop--from the furniture factory and paint shop--the home economics shop--from the sewing factory. School children fill orders not only during their labor lessons, but also on non-class time. Every member of the brigade works 2-3 hours once a week at a time that is convenient for him. All work of the adolescents and senior classmen is guided by the council of the brigade which is responsible for its activity to the council of the detachment and the Komsomol committee.

And in the first year the school children manufactured products worth an overall sum of 13,500 rubles; in subsequent years the brigade's financial plan, depending on the number of students, ranged from 15,000 to 20,000

a year. During the past 5 years about 50,000 rubles of money earned by the children has been spent on conducting excursions, walking tours, trips, purchasing musical instruments, sports equipment, books and so forth. Work in the student production brigade helps school children to understand more deeply their labor duty and responsibility, labor efforts and discipline, which means maintaining and multiplying the national good. They come to understand the value of the earned ruble.

Among pedagogues, parents and school children themselves, many critical issues arise around the problem of "children and money." Should school children be paid or not be paid for participation in productive labor? The answer to this question can be given on the basis of our labor legislation which stipulates equal payment for equal labor of all workers, regardless of sex and age. Therefore output norms of minors are established based on a short working day. A more complex issue is that of forms of payment for the labor of school children.

The experience of the brigade of the sixth Taganrog school and many other labor associations of students shows that in places where the labor of the children is organized collectively, where they work approximately an equal amount of time and perform work that requires approximately the same skills, it is most correct to create so-called collective wage funds. All of the money earned by school children is spent for their direct needs--payment for additional food, satisfaction of the multifaceted spiritual needs--and exempt from any deductions into the state budget. Money coming into the school account from the accounts of client enterprises is also spent for the needs of the children. It is especially important that the children themselves actually handle these funds.

It is another matter when in the summer the school child individually takes temporary work. Thus in the Baltic Republics tens of thousands of children each summer work at enterprises and in the sphere of public catering, especially in the health resort zone, and participate in keeping up the grounds of cities and villages. Under these conditions school children receive individual wages. But here too it is important to remember that we are dealing with children. To issue the 20-30 rubles earned by the adolescent once every two weeks "through the little window" is no help in their upbringing and sometimes can turn into a bad thing: "washing" money that is received and searching for other questionable diversions. Individual earnings should help instill respect for labor and its results as well as for people of labor. Those schools act correctly in which earnings are awarded to the students under festive circumstances before the beginning of the school year in the presence of their parents. In the festive setting they read the order of the enterprise which sums up the results of the summer quarter and takes note of students who have displayed diligence, discipline, a feeling of mutual assistance among comrades and labor sharpness. Leading workers and Komsomol members of the enterprise award certificates and gifts to the school children and then every school child receives an

envelope with his earnings and a copy of the payment sheet from the bookkeeping office (so that they learn in practice to understand the principle of payment for labor).

But no matter how carefully one plans the awarding of wages to school children, each family spends this money its own way. And pedagogues are frequently sincerely convinced that this is a purely personal matter of the parents of the children themselves. Of course, the school cannot dictate how the money earned by the school children should be handled. But it is necessary to conduct systematic, well-thought-out work with school children and parents. One cannot reconcile oneself to the fact that in many families the parents teach the children to selfishly spend all the money earn on their own personal needs: for purchasing elegant things, fashionable records and cassettes, and so forth. And it is hardly more correct when certain parents simply take the earnings from the children, explaining this approximately thusly: "Why do you need money, everything is done for you and if you need money for a movie--ask for it." Certain mamas and papas hurry to open a savings account in the name of the adolescent: "Save your money, you will need it when you grow up." And there are also those who spend all of their son's or daughter's earnings to arrange a festive celebration, not thinking about the harm such parents' predilections or noisy entertainment causes the children.

The family is also a labor collective and the adolescent is a member of this collective. Let his earnings make up part of the family budget, but for correct education of children is extremely important that all questions of distributing family funds, like questions of consumption, be considered and decided together. Those parents are correct who teach their children to spend their earnings mainly for the satisfaction of various spiritual needs of the entire family: on attending a concert, a new theater performance, an exhibit in a museum, purchasing books for the family library, excursions out of town or tourist hikes. By a common decision, the necessary amount from the parents' money is added to the money earned by the children. The children are charged with making the expenditures themselves (acquiring tickets to the movie or an excursion, books, all necessary equipment and groceries for the trip). Expenditures for ice cream, badges, picture postcards and souvenirs and also envisioned.

The most difficult question for the majority of families is that of pocket money for the children. In school one sometimes sees a second grader take five rubles out of his pocket to purchase an apple or a piece of candy at the snack bar. The parents of such a child are acting unthinkingly when they give an 8-year-old school child an amount of money that clearly exceeds his reasonable expenditures. But when one sees a ninth-grader humbly ask his father for 50 kopecks for a movie, this also produces a strange impression. It is obvious that one must recognize it is as normal for a 15 or 16 year old adolescent, especially one who has earned money during the summer holidays, to have a small amount for pocket expenditures which

he can spend at his own discretion without accounting to his parents. It is important to instill in the adolescent a need to spend his own money in such a way that not only he himself, but also the people around him receive benefit and satisfaction. It is good when an adolescent uses his own money to take a younger sister to the zoo, purchases warm mittens for his grandmother on her birthday or invites a classmate to a movie and does not pile up rubles in his bank book.

Earnings are a private matter of those to whom they belong. Therefore it would be wrong to simply declare to school children that part of the money they earn will be spent on collective needs. It is important for them to come to the conclusion themselves that collective forms of wages are advantageous, useful and convenient for them. Any arbitrary decisions made by pedagogues without the participation of the school children themselves and their parents will be both illegal and harmful in the educational sense.

The concept of material incentives for the labor of school children cannot be reduced directly to the problem of profit from the children's participation in production and the distribution of the results of their labor activity. The sphere of consumption also has important educational significance, including such a sphere as the organization of food service for school children. It still frequently happens that the family and the school do not devote enough attention to efficient organization of the food service for the children so that it meets the requirements of medicine and of the science of modern living. School snack bars sometimes evoke in the children a squeamish attitude toward any "institution" food. At the same time some families consider it a sign of good taste to have a table which is literally breaking under the abundance of hors d'oeuvres and drinks; during mealtimes the parents allow themselves to smoke, tell anecdotes and all this in front of the children. A lack of development of the art of living and communicating under conditions of material abundance presents a serious danger for the forming personality. The disparity between material and spiritual needs evokes in the school children an interest in false values, in "special" food which can be sampled in a cafe or restaurant and in various irritants of taste sensations that drug the psyche (smoking, alcohol).

A most important stimulus for good nutrition, especially for children, is a variety of food. The sample daily selection of food products developed by the Institute of Nutrition of the USSR Academy of Medical Sciences for children and adolescents includes 25 kinds of food, including about 300 grams of vegetables and 250 grams of fresh fruits and berries daily. Hot lunches at school and in groups with extended days, also dinners, are very important for maintaining the students' ability to work throughout the school day. They should consist of various foods: milk, fish, eggs, meat, dairy products, vegetables and fruits.

The variety of food and its taste qualities are determined not only by the selection of foods, but also by the organization of food service in the school. Let us give an example from the experience of one rural boarding school. The administration supplied all of the necessary selection of foods. But the observations of the pedagogues showed that many school children leave part of their meals on their plates. At the same time adolescents frequently carry pieces of bread and apples in their pockets. In a store of a nearby village students of the boarding school purchased not only sweets, but also processed cheeses, poppy seed and raisin buns and so forth.

Having consulted with the educators and school children, the administration changed the menu. Moreover, they decorated the dining room attractively: light blinds appeared on the windows; the tables, covered with bright tablecloths, were arranged in such a way that no more than four or six children sat at them. On the tables were attractive clay pitchers with kvass made of rye crackers with the addition of berries, small bouquets of flowers, little glasses with paper napkins; the unattractive aluminum spoons were replaced with modern tableware. Soft music was heard during mealtime in the dining room.

Hors d'oeuvres--salads, vinaigrettes, pickled herring, marinated fish, sauerkraut, steeped apples and so forth--were attractively arranged on the table and the children themselves divided them up. They learned to pay attention to their comrades at the table and to serve one another. The first dishes were placed directly on the table in small containers from which the person in charge gave each a portion which he could eat. The cook began more frequently to prepare dishes that the children especially liked: doughnuts, fritters and pancakes, cabbage pies, carrots, rice, meat, berries and so forth. Each breakfast, lunch and dinner became a small, but pleasant event for the children. Frequently among the children one could hear the approving rejoinders: "Wheat kasha with raisins and pumpkin--finger-licking good," "and today for lunch--cabbage pie!" Appetite and enjoyment, which I. P. Pavlov called signs of a normal and beneficial meal, from day to day contributed to the formation of healthy food requirements in the children.

Material incentives related to the clothing of school children deserve serious attention from pedagogues. As we know, a convenient, hygienic and attractive uniform that is the same for all school children is exceptionally important. But what if this new uniform is no longer attractive to the children after a certain amount of time (styles change!)? What a difficult problem it can become to force them to wear it! But, after all, the uniform along with other merits, helps to overcome a certain psychological barrier which sometimes arises among students under the influence of the different material capabilities of the parents. Here is just one example: an eighth grade girl sent a letter to the editorial staff

of a magazine in which she complained that her mother, a cleaning lady, could not provide her with pretty enough things and she wanted very much to have fashionable shoes.

In and of itself, the desire of a 15-year-old girl to have fashionable shoes and a pretty dress is quite natural. Pedagogues and parents are misled when they see something reprehensible in such desires of adolescents. Fashionable shoes can be worn to a school evening or to a ballroom dance or they can be worn to a questionable party. Everything depends on the system of needs to which one ascribes this desire which generally has been understood since the time of Cinderella. Therefore it is necessary to strive not for ascetic restriction of the children, but the instilling in them of true ideas about fashion and beauty and the ability to utilize each thing for its true purpose. Thus ultrafashionable faded jeans will be appropriate at work or during a bicycle ride, but will make the other children laugh if their happy owner appears in them at a concert. A bright coat will be accepted as the natural thing on a tourist outing, but a person who comes to a solemn Kom-somol meeting in such colorful attire will be greeted with a certain bewilderment.

The main thing is that 15- and 16-year-old young people should want to have things not simply because they are in fashion, but because they suit their own desires, in the first place from the point of view of the possibility of earning their own money for the desired purchase (or at least for part of the cost) and, in the second place, from the point of view of the priorities of various needs of the entire family -- parents, elder and younger brothers and sisters. In other words, in each specific case there should be not only stimuli related to consumption, but also stimuli related to production and distribution.

Such material stimuli as scientific-technical equipment for labor, organization of the labor collective, competition in it and so forth are of no small educational significance. Let us consider them, if only briefly.

Let us take the most elementary example -- organizing the cleaning up of the school room. Each student in one class has been given his job. One -- to clear off the tables; another -- to wash part of the wall, a third -- to sweep the floors, and so forth. On the surface, the work looks like it is collective, but in reality each child is working separately and not with the others. In the labor process they are essentially not involved with one another. In the neighboring classroom the matter is organized in a different way: six brigades are created, each of which has a certain job. One brings in fresh water and carries out dirty water, another rearranges the furniture and school equipment, a third washes the floors, a fourth washes the walls, a fifth puts the office corner in order and washes the plastic flowers on the window sill and a sixth does minor repair of furniture and rinses out the rags when the cleaning is completed. Cleanliness in the room is achieved through common efforts as a result of clear-cut division of labor. With

such actually collective organization of labor, the students perform the work approximately twice as fast and do a considerably better job; and the main thing is that the children experience a real feeling of responsibility for their common success.

School children are very interested in work that involves technical devices. Even work which seems unattractive at first glance, like cleaning up the school yard, becomes interesting for adolescents if they can use the mechanical "yardman," a motor scooter with a trailer cart for garbage, revolving brushes and a lawn mower with a gasoline motor. Teachers frequently prefer to organize all of the children's labor in the old way, by hand, because this is simpler and safer. In reality, everywhere where school children work with various kinds of technical equipment, the danger of injury increases and the children need special training and carefully thought out instruction. But the educational and economic effect of technically equipped labor is immeasurably greater. Of course, technical equipment should be especially designed for the adolescent: small, easy to operate and as safe as possible. It is necessary to enlist school scientific societies, efficiency experts and inventors from among the teachers and the school children themselves to manufacture this equipment.

In conclusion, let us consider the possibilities of incentive from competition within labor collectives of school children. Komsomol and pioneer organizations have accumulated considerable experience in organizing competition of school children. Still, neither the teachers nor managers of enterprises, kolkhozes where school children work always take into account the specific nature of competition within a collective of children and adolescents. In a labor collective of adults, for example, it never enters anyone's mind to encourage a worker who fulfills the plan by only 90 percent. But in a collective of a school production brigade this is possible: a youngster who is trying, but still cannot fulfill the norm deserves encouragement. Teachers sometimes forget about the fact that children are competing and that the organization of the competition itself, the development of its conditions, the accounting and summing up of results -- all this should be creative work of the children themselves. In organizing the competition, it is necessary to have room for initiative and independent activity of the school children. Only under this condition will the competition be an actually powerful stimulus for the development of the collective and of each individual who is being formed.

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ON SELECTION AND TRAINING OF PERSONNEL

Moscow FINANSY SSSR in Russian No 1, 1978 pp 70-74

[Article by V. V. Zhilyakov, chief of the organizational inspectorate division of the Central Personnel Administration of the USSR Ministry of Finance]

[Text] L. I. Brezhnev said in his report at the 25th CPSU Congress: "The party is taking the higher requirements into account as it undertakes to organize the training and retraining of personnel and is doing everything necessary so that trained people raise their theoretical level and deepen their knowledge."

Successful fulfillment of tasks facing financial agency officials concerned with staff size requires that directors of financial agencies give everyday attention to the selection, assignment, indoctrination, regular improvement of qualifications and training of personnel. The USSR Ministry of Finance has worked out a program of measures concerning improvement of the qualifications of financial agency personnel, including personnel concerned with staff size.

Over the last 3.5 years 139 supervisory personnel concerned with staff size have been trained in the faculty for improvement of qualifications of the All-Union Correspondence Institute for Finance and Economics, 30 of them staff members of the Central Personnel Administration of the USSR Ministry of Finance.

The educational level of officials of financial agencies specializing in staff size is rising every year. At the beginning of 1977 95.3 percent had higher and secondary specialized education, while the level was 76 percent in Lithuanian SSR and 81.2 percent in Armenian SSR. In Belorussian SSR all personnel of financial agencies specializing in staff size have specialized education, and 63.8 percent of them have higher education.

Much is being done to train and retrain personnel.

At the beginning of 1977 the financial agencies of the RSFSR had 1,451 specialists in staff size. Much is being done to improve their professional qualifications. In Leningrad there are special 2-month courses in which between 50 and 60 staff-size specialists of local financial agencies are trained every year. The RSFSR Ministry of Finance has taken steps to improve the quality of training through these courses. In particular, the syllabus of the courses has been thoroughly revised so as to pay the principal attention in it to problems in work on staff size. The best qualified specialists of the ministry's personnel administration are being assigned to teach these courses. Moreover, in the finance ministries of the autonomous republics and financial divisions of krays, oblasts and cities classes are being regularly held to improve the professional qualifications of personnel working on staff size.

Serious attention is also being paid to this topic in the financial agencies of the Ukraine. Standing 1-month course for improvement of the qualifications of specialists in staff size have been organized in the Odessa Financial Tekhnikum. Every year 2-day seminars are held in Kiev for chiefs of the staff-size divisions of oblast financial divisions, the Kiev and Sevastopol' city financial divisions, to which officials specializing in staff size of all rayon financial divisions in Kiev and the oblast are invited. These seminars include a detailed examination of all problems related to discipline concerning staff budgets, and experience is exchanged. The Donetskaya, Dnepropetrovskaya and Voroshilovgradskaya oblast financial divisions every year hold cluster seminars for those who have recently become employed in work on staff size; they make visits to enterprises and afterward there is a critical analysis of inspections. The Dnepropetrovskaya Oblast Financial Division organized exchange of experience among specialists in staff size of the oblast's 10 financial agencies in 1976. Newly hired personnel and those who had just begun to work were assigned to experienced specialists. A. Ye. Stupko, senior economist specializing in staff size of the Amur-Nizhnedneprovskiy Rayon Financial Division of Dnepropetrovsk, has shared his experience with the oblast's financial agencies. The financial agencies of Donetskaya Oblast in that same year published articles on 15 occasions in the local press treating cases of violations of staff-budget discipline by enterprises, organizations and rural consumer societies.

In courses organized by the Kazakh Ministry of Finance officials working on staff size of finance ministries of the Kazakh, Uzbek, Turkmen, Tadzhik and Kirgiz SSR's improved their qualifications. Lectures are given and seminars led by highly qualified specialists of the Kazakh Ministry of Finance.

Guided by the instructions of the 25th CPSU Congress, financial agencies are making efforts to work out economically sound proposals concerning further improvement and cost reduction of the administrative apparatus, are exercising regular supervision over adherence of enterprises, organizations and institutions to the maximum appropriations assigned them, are taking steps to correct the violations discovered, and are following closely fulfillment of

assignments for reduction of costs of maintaining the administrative apparatus and payment for official travel and the promptness of payment of the saving into the budget. Much is being done to prevent violations. But still cases are being discovered of unlawful expenditure of funds to maintain staff positions of the administrative apparatus not included in the organization chart from the wage fund for the workers and other production personnel, salary levels are unlawfully exceeded, and there are other violations of staff-budget discipline. We will give a few figures (see the table).

	<u>1974</u>	<u>1975</u>	<u>1976</u>
Overstaffing discovered by inspections, thousands of persons	81.5	95.5	103.0
Number of excessively high salary levels discovered, thousands	37.6	36.6	36.5
Sum total of unlawful and excessive appropriations for administrative expenses, millions of rubles	102.7	123.6	138.2

Moreover, in connection with the registration of organization charts and budgets of administrative expenses 6.5 million rubles of unlawful and excessive appropriations were discovered. Thus in 1976 unlawful expenditure of 145 million rubles of state money was prevented.

The figures also indicate that year after year financial agencies are improving the quality of their examinations, are exercising closer supervision, and are showing ever greater obstinacy in combating mismanagement and wastefulness.

In 1976 RSFSR financial agencies did work concerning staff size in 122,000 enterprises, institutions and organizations. They discovered overstaffing amounting to 64,400 persons, and 22,000 cases when salary levels were exceeded. In all 50.8 million rubles of unlawful and excessively high appropriations were paid into the budget. On recommendations of financial agencies 332 organizations were liquidated, and 16,600 staff positions were abolished. In 1977 the republic's council of ministers took up eight items on the basis of recommendations of the RSFSR Ministry of Finance and adopted appropriate decisions.

The financial experts of the capital have achieved good results. In 1976 their recommendations brought about a reduction of 3,966 staff units, representing an annual wage fund of 5.7 million rubles, at 464 enterprises and organizations. In all 4.9 million rubles of unlawful and excessive appropriations were confiscated and paid to the budget; this was possible because of the organizational work of the division for staff size of the Moscow City Financial Administration. Its key personnel and specialists regularly visited the rayon financial divisions in order to extend practical aid to young people at the local level. Every quarter rayon financial divisions are sent

out the principal results in work on staff size, which makes it possible to turn attention in good time to those sections are lagging in time and to take effective steps. A regular check is run on adherence to staff-budget discipline in enterprises, organizations and institutions. The summarized results of the inspections are reported to the relevant departments for correction of the violations.

Quite a bit is also being done by specialists in staff size of the rayon financial divisions in Moscow. For example, it has been established that the administrative structure of the Central Scientific Research Institute for Information and Technical-and-Economic Research on Electrical Engineering (Informelektro) of the USSR Ministry of Power and Electrification was complicated and cumbersome. M. P. Pastushkova, sector chief of the Pervomayskiy Rayon Financial Division and the institute's director, examined the assignment of personnel and the load on specific staff members. The director concurred in the recommendations of the rayon financial division. Ten divisions and laboratories were abolished, and the staff was reduced by 108 positions, representing a wage fund of 8,000 rubles per month. The institute's staff assignment in the labor plan was simultaneously reduced by 110 positions. In all the recommendations of the Pervomayskiy Rayon Financial Division in 1976 led to the abolishing of 220 positions, representing a monthly wage fund of 20,800 rubles. On the recommendations of the Dzerzhinskiy Rayon Financial Division the work force of enterprises and organizations was reduced by 315 units, representing a wage fund of 39,700 rubles per month, and reductions based on recommendations of the Kalininskiy Rayon Financial Division amounted to 402 staff positions and 45,100 rubles.

Much work has been done by financial agencies in Kazakh SSR. Inspections turned up overstaffing of 7,433, 2,112 excessive salaries, and 6,469,000 rubles of unlawful and excessive appropriations in the budget for administrative costs, which were either transferred to the budget or withheld from financial appropriations. Cost-accounting organizations and enterprises paid into the budget 6,195,000 rubles of illegal assignments. On the recommendation of financial experts of Kazakhstan 556 independent enterprises and organizations and 307 structural subdivisions were liquidated and unified, and more than 19,000 staff positions were eliminated in administrative staffs. People's control bodies made deductions in salaried positions amounting to 23,000 rubles. During the year the republic's Ministry of Finance prepared and sent to the Kazakh Council of Ministers 10 reports on violations in expenditure of funds to maintain administrative staffs and on making control over use of maximum assignments more effective. The republic's government took the appropriate decisions concerning all these reports.

In 1976 during a check of enforcement of staff-budget discipline in Belorussian enterprises, organizations and institutions overstaffing amounting to more than 2,800 persons was discovered, representing a monthly wage fund of 256,000 rubles. The budget was paid 1.7 million rubles of unlawful and excessive appropriations. Checks on enforcement of staff-budget discipline by the republic's financial agencies involved 248 voluntary inspectorates,

experienced bookkeepers, economists and other specialists of enterprises and organizations.

Financial agencies of Dnepropetrovskaya, Donetskaya, Voroshilovgradskaya, Nikolayevskaya, Sverdlovskaya and other oblasts have achieved authentic results in improving the administrative staff and in monitoring enforcement of staff-budget discipline in enterprises and organizations.

Certain financial agencies of the union republics are not carrying out the procedure established by the USSR Ministry of Finance, which calls for a check at least twice a year on enforcement of staff-budget discipline by enterprises, organizations and institutions. In Uzbek SSR in 1975 these checks were run on only 41.2 percent of the enterprises and organizations, while the figure in 1976 was 40.3 percent; the respective figures are 42.8 percent and 44 percent for Tadzhik SSR and 45 and 46.9 percent for Azerbaydzhan SSR. The financial agencies of Tadzhikistan are not satisfactorily studying the structure and staff size of enterprises, organizations and institutions. Supervisory personnel of the Personnel Administration of the republic's Ministry of Finance rarely visit financial agencies to extend practical assistance. The same applies to certain financial agencies of the RSFSR. Key officials of the Personnel Administration of the RSFSR Ministry of Finance do not always help them in their work on staff size, do little to prepare recommendations that represent initiative toward stepping up control over expenditure of funds to maintain the administrative apparatus.

As is well known, the Central Personnel Administration annually sends financial agencies assignments concerning checks on enforcement of staff-budget discipline, expenditures for official travel, and so on. In 1977 more than 1,000 enterprises, organizations and institutions were checked on assignments from the USSR Ministry of Finance. But frequently these checks are not performed competently, which is why in a number of cases the material cannot be used. For example, in certain certificates of inspection concerning proper expenditure of funds for official travel the amount of the established ceiling is not indicated, nor the actual expenditure.

In accordance with the decision of the collegium of the USSR Ministry of Finance the Central Personnel Administration has revised its Instruction No 276, dated 31 December 1971, and entitled "On Procedure for Conducting Checks on Enforcement of Budget-Staff Discipline in Enterprises, Organizations and Institutions."

It will take into account the relevant recommendations of the financial agencies of the union republics related to amendments in legislation concerning official travel and the practice of financial work concerning staff size. Moreover, the Central Personnel Administration is preparing for publication in the first half of 1978 a collection of legislation now in effect concerning the financing of the administrative staff and methodological instructions for checking staff-budget discipline.

But directives alone mean little. If all personnel of financial agencies concerned with staff size do not show creative initiative and persistence, we will not perform the important tasks confronting us.

We must continue the course toward further improvement of the quality of training of economists, inspectors and controllers concerned with staff size and this means training personnel again and again! More attention should be paid to the indoctrination of personnel, to enhancing their responsibility for the quality of the checks they run, and a regular and extensive exchange of experience should be organized so that the most effective and proven methods of inspection are adopted in practice.

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DISCUSSION OF CORRECTIVES FOR WAGE FUND PLANNING

Moscow VESTNIK STATISTIKI in Russian No 1, 1978 pp 40-44

[Article by V. Sivtsov and N. Tsindin: "On the Determination of Savings (Over-expenditures) in the Wage Fund"]

[Text] In the economic literature of the last years many different proposals have been expressed to improve the existing practice of adjusting the wage fund of industrial production personnel in the determination of relative savings or over-expenditures.¹

The following propositions underlie the suggested method for the recalculation of the planned wage fund:

1. First of all, the correction is to be applied to the planned wage fund of workers, since the magnitude of this fund depends to a significant degree on the quality of output produced which is closely linked with the change in labor productivity. It would be better to adjust the wage fund for piece-workers but the operative reporting system of the enterprise does not allow for a segregation of their wage fund on a quarterly basis. The planned corrected fund for industrial production personnel is calculated as the sum of the planned corrected fund for workers and the planned fund for other categories of industrial production personnel.

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1. For example, in an article published in VESTNIK STATISTIKI No 11, 1975 N. Denisov proposes to eliminate the recalculation of the planned fund in dependence on the degree of fulfillment of the production plan with allowance for correction factors and suggests changing the fund in dependence on fulfillment of the labor productivity plan with allowance for the norm relationship between the growth rates of labor productivity and wages.

2. The planned wage fund is determined for a definite number of workers, taking into account their average wage. For that reason a change in the wage fund also depends on changes in these two factors. However, usually the adjustment is applied to one or the other factor. In our opinion, both factors should be corrected. The number of workers is corrected for the degree of fulfillment of the output plan, taking into account the planned share of the output increment owing to an increase in the number of workers and their average wage is corrected for the degree of fulfillment of the labor productivity plan, taking into account the planned norm indicator of wage growth per one percent increase in labor productivity. Growth in the productivity of labor is accompanied by an increase in the level of its remuneration. At the same time, the growth rate of labor productivity should exceed the growth rate of the average wage. We shall consider that the optimal magnitude for this differential has been envisaged in the plan of the enterprise. Hence, an increase above the planned level of labor productivity corrected for the planned norm indicator should raise the planned wage level, but to a less degree than by which productivity increased. The average (partial coverage) wage is calculated from the wage fund without taking into account payments from the material incentive fund.

3. In those enterprises where this is possible, the indicator of the volume of production should be net production or its variants, conventional net production and normative net production. In the course of the last few years the normative net production measure has been computed in a number of machine-building enterprises. It is exempted from the expenditures of past labor and closely connected with the expenditures of the labor of workers of a given period with the fund of their wages. For the remaining enterprises where this indicator is not computed, the indicator for the volume of production should in our opinion be either gross or commodity production, the volume of production measured in processing cost norms or other indicators except those based on realized or shipped production since these do not correspond to measures of output produced in the period under review and consequently are not linked to the labor expenditure of this period. The indicators of gross or commodity production are more closely connected with the labor expenditures and the wage fund. However, gross and commodity production include not only the value of live labor but also that of past labor which was expended earlier by workers of other enterprises and in the given enterprise is merely transferred to the output produced. The wage fund, on the other hand, characterizes the remuneration of the labor of workers of the given enterprise. Hence changes in the share of past labor, as also other peculiarities of the value indicators of the volume of production (changes in the level of cooperation, in price formation, and so on), can contribute to an incorrect characterization of changes in the wage fund.

Below we will adduce the formulae for the determination of savings or overexpenditures of the wage fund for the industrial production personnel of an enterprise, F^x , constructed on the basis of the above considerations:²

$$\mathcal{O}^{x(p)} = \mathcal{O}_{\text{отн.}}^p + \mathcal{O}_{\text{абс.}}^{1(p)} = F_1^x - (F_{\text{плк}} + F_{\text{пл}}^1) = (F_1 - F_{\text{плк}}) + (F_1^1 - F_{\text{пл}}^1)$$

in terms of rubles, and

$$\mathcal{O}^{x(\%)} = \frac{F_1^x - (F_{\text{плк}} + F_{\text{пл}}^1)}{F_{\text{плк}} + F_{\text{пл}}^1}$$

in percentage terms, where

$\mathcal{O}_{\text{отн.}}$, $\mathcal{O}_{\text{абс.}}$ represent, respectively, the relative (*отн*) and absolute (*абс*) savings or overexpenditures of the wage fund;

F_1 , $F_{\text{пл}}$, $F_{\text{плк}}$ the wage fund, respectively: actual (*1*), planned (*пл*) and planned adjusted (*плк*).

Relative savings or overexpenditures of the wage fund of workers are determined in the following manner:

$$\mathcal{O}_{\text{отн.}}^p = F_1 - F_{\text{плк}} = F_1 - F_{\text{пл}} [1 + (A + B + AB)] = (F_1^1 - F_{\text{пл}}) - (F_{\text{пл}}A + F_{\text{пл}}B + F_{\text{пл}}AB),$$

where

$$A = (i_{1/\text{пл}}^{\text{чп}} - 1) d_{\text{пл}/0}^{\Delta \text{чп}(T)},$$

$$B = (i_{1/\text{пл}}^W - 1) H,$$

чп = net production

$$i_{1/\text{пл}}^{\text{чп}} = \frac{\text{чп}_1}{\text{чп}_{\text{пл}}};$$

$$d_{\text{пл}/0}^{\Delta \text{чп}(T)} = \frac{(T_{\text{пл}} - T_0) w_0}{\text{чп}_{\text{пл}} - \text{чп}_0} = \frac{i_{\text{пл}/0}^T - 1}{i_{\text{пл}/0}^{\text{чп}} - 1}, \text{ or the increase in net production which}$$

according to the plan is owed to the increase in the number of workers;

T = the average registered number of workers;

$$i_{\text{пл}/0}^T = \frac{T_{\text{пл}}}{T_0};$$

$$i_{\text{пл}/0}^{\text{чп}} = \frac{\text{чп}_{\text{пл}}}{\text{чп}_0};$$

$$i_{1/\text{пл}}^W = \frac{W_1}{W_{\text{пл}}},$$

$$H = \left[\left(\frac{F_{\text{пл}}}{T_{\text{пл}}} : \frac{F_0}{T_0} \right) - 1 \right] : \left[\left(\frac{\text{чп}_{\text{пл}}}{T_{\text{пл}}} : \frac{\text{чп}_0}{T_0} \right) - 1 \right] = \frac{i_{\text{пл}/0}^F - i_{\text{пл}/0}^T}{i_{\text{пл}/0}^{\text{чп}} - i_{\text{пл}/0}^T}, \text{ or the}$$

planned norm of wage increase per one percent increase in labor productivity.

2. Here and in the following, a superscript "x" designates the industrial production personnel, a superscript "1" the industrial production personnel other than workers, and an indicator without superscript workers alone.

In this case the relative savings or overexpenditures of the wage fund of workers are also more correctly determined by means of changes in their average wage and in their number.

$$\frac{F_1}{F_{\text{плк}}} = \frac{f_1}{f_{\text{плк}}} \times \frac{T_1}{T_{\text{плк}}}$$

$$\text{and } F_1 - F_{\text{плк}} = (f_1 - f_{\text{плк}}) T_1 + (T_1 - T_{\text{плк}}) f_{\text{плк}}$$

$$\text{Here } T_{\text{плк}} = T_{\text{пл}} (1 + A)$$

$$\text{and } f_{\text{плк}} = f_{\text{пл}} (1 + B),$$

where $f_1, f_{\text{пл}}, f_{\text{плк}}$ represents the level of wages of one worker, respectively: actual (), planned () and planned adjusted ().

The proposed formula for the determination of savings or overexpenditures on the wage fund of workers can have a number of specific applications. For instance, if according to the plan the entire increase in output is envisaged to stem from the increase in labor productivity of workers, the savings or overexpenditures of the wage fund are computed on the following formula:

$$\begin{aligned} F_1 - F_{\text{плк}} &= F_1 - F_{\text{пл}} \left[1 + (i_{\text{л/пл}}^{\text{W}} - 1) \frac{i_{\text{пл/0}}^{\text{F}}}{i_{\text{пл/0}}^{\text{чп}}} \right] \text{ and} \\ F_1 - F_{\text{плк}} &= f_1 T_1 - f_{\text{пл}} \left[1 + (i_{\text{л/пл}}^{\text{W}} - 1) \frac{i_{\text{пл/0}}^{\text{F}}}{i_{\text{пл/0}}^{\text{чп}}} \right] T_{\text{пл}} = \\ &= (f_1 - f_{\text{плк}}) T_1 + (T_1 - T_{\text{пл}}) f_{\text{плк}}. \end{aligned}$$

On the basis of conventional data for a plant for the first quarters of 1975 and 1976 (see tabulation below), we determine the relative savings (-) or relative overexpenditures (+) on the wage fund for industrial production personnel.

According to the presently employed methodology (for industrial production personnel):

$$\begin{aligned} \mathcal{J}^{x(p)} &= F_1^x - F_{\text{плк}}^x = F_1^x - F_{\text{пл}}^x \left[1 + \left(\frac{T\pi_1}{T\pi_{\text{пл}}} - 1 \right) K \right] = \\ &= 1\,928\,000 - 1\,962\,000 \left[1 + \left(\frac{10\,182}{10\,075} - 1 \right) \cdot 0,6 \right] = \\ &= 1\,928\,000 - 1\,962\,000 \times 1,0066 = -46\,949 \text{ rubles} \end{aligned}$$

$$\mathcal{J}^{x(\%) } = \frac{F_1^x - F_{\text{плк}}^x}{F_{\text{плк}}^x} \times 100 = \frac{-46\,949}{1\,974\,949} \times 100 = -2,38\%.$$

According to the recommended methodology, based on commodity production:

(a) for workers:

$$\begin{aligned}\mathcal{P} &= F_1 - F_{\text{плк}} = F_1 - F_{\text{пл}} [1 + (A + B + AB)] = \\ &= 1606600 - 1579000 [1 + (0,00048 + 0,0032 + 0,000002)] = \\ &= 1606600 - 1579000 \times 1,0037 = 1606600 - 1584845 = 21755 \text{ rubles,}\end{aligned}$$

where

$$\begin{aligned}A &= (1,011 - 1,0) \frac{1,003 - 1,0}{1,069 - 1,0} = 0,00048, \\ B &= (1,007 - 1,0) \frac{1,033 - 1,003}{1,069 - 1,003} = 0,0032\end{aligned}$$

and

$$\begin{aligned}F_1 - F_{\text{плк}} &= f_1 T_1 - f_{\text{плк}} T_{\text{плк}} = (f_1 - f_{\text{плк}}) T_1 + (T_1 - T_{\text{плк}}) \cdot f_{\text{плк}} = \\ &= (469,5 - 464,5) 3422 + (3422 - 3412) 464,5 = 17110 + 4645 = 21755 \text{ rubles.}\end{aligned}$$

(b) for industrial production personnel:

$$\begin{aligned}\mathcal{P}^{(p)} &= F_1^x - F_{\text{плк}}^x = (F_1 - F_{\text{плк}}) + (F_1^1 - F_{\text{пл}}^1) = (1606600 - 1584845) + \\ &+ (321600 - 383000) = 21755 + (-61400) = -39645 \text{ rubles;}\end{aligned}$$

$$\begin{aligned}\mathcal{P}^{(p)}(\%) &= \frac{F_1^x - (F_{\text{плк}} + F_{\text{пл}}^1)}{F_{\text{плк}} + F_{\text{пл}}^1} 100 = \frac{-39645}{1584845 + 383000} = \frac{-39645}{1967845} \times \\ &\times 100 = -2,0\%\end{aligned}$$

According to the recommended methodology, based on net production:

(a) for workers:

$$\begin{aligned}\mathcal{P} &= 1606600 - 1579000 \left\{ 1 + \left[(1,0125 - 1,0) \times \right. \right. \\ &\times \frac{1,003 - 1,0}{1,074 - 1,0} + (1,009 - 1,0) \frac{1,033 - 1,003}{1,074 - 1,003} + (1,0125 - 1,0) \times \\ &\times \left. \left. \frac{1,003 - 1,0}{1,074 - 1,0} \times (1,009 - 1,0) \frac{1,033 - 1,003}{1,074 - 1,003} \right] \right\} = \\ &= 1606600 - 1580409 = 26191 \text{ rubles}\end{aligned}$$

and

$$\begin{aligned}F_1 - F_{\text{плк}} &= (f_1 - f_{\text{плк}}) T_1 + (T_1 - T_{\text{плк}}) f_{\text{плк}} = (469,5 - 463,2) 3422 + \\ &+ (3422 - 3412) 463,2 = 21559 + 4632 = 26191 \text{ rubles}\end{aligned}$$

(b) for industrial production personnel:

$$\begin{aligned} \Delta x(p) &= (F_1 - F_{плк}) + (F_1^1 - F_{пл}^1) = (1\,606\,600 - 1\,580\,409) + \\ &+ (321\,600 - 383\,000) = 26\,191 + (-61\,400) = -35\,209 \text{ rubles;} \\ \Delta x(\%) &= \frac{-35\,206}{1\,963\,409} 100 = -1,79\% \end{aligned}$$

(1)			(2)			(3)						(4)		
Товарная продукция в сопоставимых ценах, в тыс. руб.			Чистая продукция в сопоставимых ценах, в тыс. руб.			Фонд заработной платы, в тыс. руб.						Среднесписочная численность рабочих		
						(5)			(6)					
						промышленно-производственного персонала			рабочих					
1976 г.			1976 г.			1976 г.			1976 г.			1976 г.		
(7)	(8)	(9)	(7)	(8)	(9)	(7)	(8)	(9)	(7)	(8)	(9)	(7)	(8)	(9)
1975 г. факт.	по плану	факт.	1975 г. факт.	по плану	факт.	1975 г. факт.	по плану	факт.	1975 г. факт.	по плану	факт.	1975 г. факт.	по плану	факт.
9 429	10 075	10 182	3 865	4 150	4 202	1 962	1928,2	1528,0	1579,0	1606,6	3 400	3 410	3 422	

Key:

1. Commodity production at comparable prices, thous. rubles
2. Net production at comparable prices, thous. rubles
3. Wage fund, thous. rubles
4. Average registered number of workers
5. Industrial production personnel
6. Workers
7. 1975 actual
8. 1976 planned
9. 1976 actual

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END